Pacific Marine Science Report 74-8

AN ASSESSMENT OF THE USES OF ERTS-1 ARCTIC IMAGERY

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MARINE SCIENCES DIRECTORATE, PACIFIC REGION

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Victoria, B.C.
Marine Sciences Directorate, Pacific Region,
Environment Canada,
May, 1974

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I. Introduction

The NASA ERTS-1 (Earth Resources Technology) satellite was launched during July, 1972. Moving in a nearly polar, sun-synchronous orbit at an altitude of 900 km, this satellite contains a Multi-Spectral Scanner (MSS) capable of providing surface imagery in each of four wavelength bands: MSS-4 (0.5 to 0.6 μm), MSS-5 (0.6 to 0.7 μm), MSS-6 (0.7 to 0.8 μm), and MSS-7 (0.8 to 1.1 μm). Digital representations of images obtained over Canada and its environs are transmitted to, and recorded at, the Prince Albert, Saskatchewan receiving station of the Canadian Centre for Remote Sensing (CCRS). So-called Quicklook 9" x 9" photographic representations of the image data may be obtained from Donald Fisher Ltd., of Prince Albert within two weeks of the observation date. The National Air Photo Library (NAPL) in Ottawa also provides imagery, after somewhat greater delay, which is partially corrected for satellite pitch and yaw and which, presumably, has fewer processing distortions than the Quicklook product. At the present time, however, the most consistent high quality imagery is being obtained directly from the Sioux Falls, S. Dakota, office of EROS. The delivery time in the latter case is approximately 1 to 3 months.

The Marine Sciences Directorate, Pacific Region, has now compiled approximately 750 Quicklook and NAPL images of the eastern Beaufort Sea and western Canadian Arctic archipelago (See Figure 1 and Table 1). The motivation for

assembling this collection was provided by the growing need to monitor the movements, growth and melting of ice in conjunction with the Beaufort Sea and other Arctic research programs. The present report offers a brief summary and evaluation of the usefulness of satellite imagery in these contexts. It begins in Section II with a short description and discussion of the characteristics of this imagery such as the degree of surface coverage, repetition rate, resolution, and accuracy. Examples of the use of this new observational tool in the Canadian Arctic are then given (Section III) prior to a summary and recommendations in the closing Section IV.

II. Imagery Characteristics

The standard ERTS-1 image represents a 185 km x 185 km region of the earth's surface. Repetitive coverage is obtained at eighteen-day intervals when earlier orbits are retraced. However, due to the convergence of orbital paths at the higher latitudes, a given location in the Canadian Arctic can usually be observed (cloud-cover permitting) on at least five successive days. In the 1973 ice year, atmospheric conditions in our areas of interest were such that detailed successive-day imagery was obtained primarily in the June 14 to July 28 time interval. Nevertheless, in spite of spatial and temporal discontinuities in coverage, useful data can be extracted during most of the April to October viewing period. Qualitative monitoring of ice and snow conditions is possible over an even longer fraction of

the calendar year (see Figures 2a-2e) even at a 75°N latitude.

The resolution of ERTS-1 imagery is roughly 70 m. This figure may apply to the processed NAPL and NASA products but a 100 m value would seem more realistic in the case of Quicklook representations. A similarly reduced accuracy or freedom from distortion is also associated with the latter images. According to the CCRS estimates[1], the relative positions of any two points can be specified with 500 m accuracy only in 25 km x 25 km or 10 km x 10 km areas respectively of the NAPL and Quicklook imagery.

Since many applications require measurements of relative position over distances significantly larger than 25 km, further discussion of accuracy is appropriate. In particular we shall concern ourselves with measurements which extend across two or more 185 km x 185 km Quicklook images. Precise relative positioning of the adjoining (along orbital-track) images is greatly complicated by several defects:

1. Quicklook imagery does not offer continuous coverage along the orbital track. Instead, gaps corresponding to distances ranging between 1 and 3 km separate the adjoining images.
2. The dimensions of the nominally square or rectangular images are not constant. Some of this variation can be attributed to the characteristic "pin cushion" distortions which arise from non-linearities in the oscilloscopic representation of the raw digital image data. In general, we found that both the across-track and along-track

dimensions were subject to a roughly 1 mm variation within each image.

3. These images were not corrected for the distortions induced by the earth's rotation. The resultant distortions correspond to a "skewing" arising from the "shear" in the cross-track scan lines and to a reduction in the along-track scale. The latter effect is introduced by the non-vanishing component of the earth surface velocity in the direction of satellite motion. These distortions diminish with increasing latitude because of the corresponding reduction in the speed of the rotating earth. At 70°N these effects produce distortions of no more than 3%. Rotational effects are accounted for in EROS and "precision processed" NAPL imagery.

4. An unexplained distortion in the imagery obtained prior to July 24, 1973, produces an along-track scale of approx. 1:900,000 as compared to 1:1,000,000 cross-track[2]. On the latter date, a deliberate "shrinkage" of roughly 8% was effected in the along-track direction to correct this situation.

We have attempted to estimate the errors which these defects introduce into long-range surface mapping. Our procedure was based upon comparisons of the daily image swaths which can be constructed from adjoining along-track photos. In those instances when land or unchanging ice features

appeared in and near the "gap" region, relative positioning of these images was satisfactorily effected by comparison with overlay traces obtained from uninterrupted images of these features. Accordingly, considerable uncertainty was associated with the positioning of image pairs which did not offer this advantage. These uncertainties were estimated by positioning several swaths obtained on successive days to insure the congruence (on a transparent plastic overlay) of several common coastal (Northwest Territories) landmarks. Differences were then noted (on the overlay) in the position of other, more northerly, archipelago landmarks as deduced from the different daily swaths. It was found that this uncertainty varied roughly linearly with the distance from the congruent landmark or "reference" region and remained generally less $\pm$ 1% of the latter distance. Obvious procedures may be applied to correct the small, skewness-induced errors which remain in the directions and magnitudes of the relative displacement vectors which connect any two points on these swaths.

From the above it can be seen that, to a large extent, the accuracy of mapping obtainable from Quicklook imagery is determined by the availability of reference landmarks near the region of interest. This restriction may not be as critical in the case of the processed NAPL imagery which is accompanied by the computer-calculated positions of each image centre. Although little information is presently available

concerning the accuracy of these calculated positions, their specification, which is confined to nearest minute of arc precision, would in itself introduce uncertainties of roughly 2 km into distances measured across the boundaries of adjoining along-track images. Although the present investigation has been primarily confined to the Quicklook format, it would seem useful to initiate studies of NAPL imagery with regard to its actual accuracy in long-range mapping.

III. The 1973 ERTS-1 Imagery of the Eastern Beaufort Sea

In the eastern Beaufort Sea region land features are sufficiently numerous to allow the mapping of sea ice to proceed from Quicklook imagery with an accuracy sufficient for many oceanographic applications. For illustrative purposes we have represented the uncertainties of position location at various points in this area by the circles of Figure 3a. These uncertainties were observed to be significantly smaller than the corresponding daily movements of floating ice in the spring and summer of 1973 (see, for example, Figure 4); hence allowing the construction of the ice position and velocity maps of Figures 3a, 3b, 3c.

It was found that, in spite of the absence of continuous daily ERTS-1 coverage, the time scales of the Beaufort Sea ice processes are such that the available imagery can offer a good qualitative or even semi-quantitative picture of the yearly cycle. A good portion of this cycle can be

understood, or at least described, relative to an extremely long (900 to 1000 km) lead which runs in a northeasterly direction from McKenzie Bay to Meighen Island. This lead is a distinctive feature of the NOAA II satellite image of the northern hemisphere obtained on April 9 and included as Figure 5 of this report. It appears in the earliest available (early March) 1973 Quicklook imagery and, at least in its northern sections, undergoes several refreezing-reopening cycles before a huge polynya becomes established off the west coast of Banks Island in May. The summer portion of the ice-cycle consists of three more or less distinct processes:

1. The gradual break-up and generally seaward drift of the shorefast ice which forms the eastern and southern boundaries of the polynya.
2. A westward flow of ice out of Amundsen Gulf and McClure Strait into the original polynya region.
3. The somewhat irregular motion of the edge of the great central Beaufort Sea ice pack which in fact forms the western boundary of the polynya.

The central ice pack presumably rotates in accord with the postulated Beaufort Sea current gyre and the extremely long lead observed in the early 1973 imagery represents its point of contact (and friction) with the shorefast ice. The approximate positions of the edge of the dense (9/10 to 10/10) central pack ice are also included in Figures 3a,3b,3c. It can be seen from these Figures that the rapid ice motion of June

and July diminishes as the edge of the central pack begins to move towards shore in August. In August and September, the rate of ice deterioration and motion has sufficiently slowed to allow the motion of larger floes to be followed over time intervals in excess of thirty days (see Figure 6).

Quantitative characterizations of mesoscale strain at the edge of the central ice pack have recently been obtained[3] from ERTS-1 imagery of the Point Barrow, Alaska region. Similar, and hopefully, correlated studies are of course feasible in the eastern portion of this sea.

Barnes *et al*[4] have listed several visual keys to the identification of ice-type, -age, and -surface condition from satellite imagery. ERTS-1 imagery is particularly useful in these respects because of its availability in four different wavelength ranges. It allows the high infrared reflectivity of ice, relative to water, to be used to estimate the "wetness" of a given Arctic surface. Thus, for example, the bright linear features which appear in the near infrared images of both floating and shorefast ice can be identified as either pressure ridges or surface draining fractures depending respectively upon the bright or dark aspect of the surrounding ice[4,5]. It is often possible to observe the break-up of shorefast ice along the most prominent (i.e. visually brightest) pressure ridges (see Figure 7).

In our opinion, one aspect of ERTS-1 imagery which has not been specifically noted in earlier Arctic applications

is its ability to provide qualitative information on surface wind conditions. For example, it seems likely that the surface wind direction may be deduced from the tendency of spicule or brash ice to accumulate on the downwind side of a refreezing lead (see Figure 8). As further Arctic meteorological data is accumulated, it also seems likely that the directional properties of other ice and low-lying cloud or fog formations can be used in similar contexts. Information of this kind can serve to supplement and check the wind magnitudes and directions which are calculated from meteorological charts for use in numerical models of sea-ice motion.

IV. Summary and Recommendations

This report has outlined the features of ERTS-1 imagery useful to Arctic research. It has also tried to delineate the limitations and practical disadvantages of this new form of remote data.

It seems clear that even Quicklook, the least accurate version of ERTS-1 imagery, can allow monitoring of the eastern and southern Beaufort Sea region to proceed at a frequency adequate for research programs on oil and ice interaction, wildlife movements, etc., which require only approximate specifications of ice position, packing density and lead orientation. In other studies concerned with currents and numerical modelling of storm surges, for example, the general utility of ERTS-1 data increases significantly with

its accuracy. In these cases further work seems necessary to attain and more clearly establish the ultimate accuracy of the convenient Quicklook format and to identify those applications which will require the use of either the raw digital data or the processed NAPL or NASA image products.

ACKNOWLEDGEMENT

The authors would like to thank
Mr. R. Lake for useful discussions
and for allowing us access to the
ERTS-1 imagery collected by the
Frozen Sea Research Group.

REFERENCES

1. Canada Centre for Remote Sensing, 1973: Status of the ERTS system. Remote Sensing in Canada 1, 4.

2. Fleming, E.A. (to be published), The potential usefulness of ERTS imagery for topographic map production.

3. Crowder, W.K., McKim, H.L., Ackley, S.F., Hibler, W.D. III, Anderson, D.M., 1973: Mesoscale deformation of sea ice from satellite imagery. Proceedings of the interdisciplinary Symposium on Advanced Concepts and Techniques in the Study of Snow and Ice Resources, Monterey, California.

4. Barnes, J.C. and Bowley, C.J., 1973: Mapping sea ice from the earth resources technology satellite. Arctic Bulletin 1, 6.

5. Barnes, J.C., Bowley, C.J., Chang, D.T., Willand, J.H., 1973: Application of satellite visible and infrared data to mapping sea ice. Proceedings of the Interdisciplinary Symposium on Advanced Concepts and Techniques in the Study of Snow and Ice Resources, Monterey, Calif.

Table I - A listing of the ERTS-1 Quicklook imagery which has been accumulated to date in the Marine Sciences Directorate, Pacific Region of the Arctic areas outlined in Figure I. Images have been classified according to their orbital track, date and approximate northern and southern boundaries.

Cycle C

Date	Track	Latitude (°N)
24-8-73	17C	78
25-8-73	18C	78

Cycle D

Date	Track	Latitude (°N)
16-5-73	7D	78-80
17-5-73	8D	76-80
18-5-73	9D	77-80
19-5-73	10D	80-82
21-5-73	12D	78-80
22-5-73	13D	80-82
23-5-73	14D	80-82
24-5-73	15D	80-82
25-5-73	16D	78-80
26-5-73	17D	78-80
27-5-73	18D	78-80
31-5-73	4D	78-80
3-6-73	7D	78
4-6-73	8D	78-80
5-6-73	9D	80
6-6-73	10D	73-77
7-6-73	11D	79-80
8-6-73	12D	77-79
9-6-73	13D	77-78
11-6-73	15D	79
14-6-73	18D	79-81
16-6-73	2D	78-80
18-6-73	4D	78

19-6-73	5D	78
20-6-73	6D	78
4-7-73	2D	78-80
7-7-73	5D	77-78
8-7-73	6D	78-80
10-7-73	8D	78-80
11-7-73	9D	78-80
15-7-73	13D	79-80
17-7-73	15D	78-80
18-7-73	16D	78-80
21-7-73	1D	78-80
24-7-73	4D	79-80
29-7-73	9D	78-79
30-7-73	10D	78-80
31-7-73	11D	78-80
4-8-73	15D	79-80
5-8-73	16D	79-80
14-8-73	7D	79-80
20-8-73	13D	78
21-8-73	14D	77
22-8-73	15D	78
2-9-73	8D	80
3-9-73	9D	78
7-9-73	13D	75-77
8-9-73	14D	78-81
9-9-73	15D	78-80
10-9-73	16D	80
11-9-73	17D	80
17-9-73	5D	79
22-9-73	10D	77
24-9-73	12D	78
26-9-73	14D	78
28-9-73	16D	80-78
2-10-73	2D	79
3-10-73	3D	80
5-10-73	5D	80

23-6-73	9D	77
26-6-73	12D	79
27-6-73	13D	77
28-6-73	14D	78
30-6-73	16D	78-80

Cycle E

Date	Track	Latitude (^{o}N)
27-2-73	1E	
4-4-73	1E	77-68
22-4-73	1E	
10-5-73	1E	80-69
28-5-73	1E	80-69
15-6-73	1E	81-64
3-7-73	1E	78-75
21-7-73	1E	70-68
1-10-73	1E	80-69
18-3-73	2E	80-68
5-4-73	2E	77-67
23-4-73	2E	77-67
11-5-73	2E	80-71
29-5-73	2E	80-73
16-6-73	2E	79-65
4-7-73	2E	80-67
22-7-73	2E	80-67
14-9-73	2E	80-75
2-10-73	2E	80-76
20-10-73	2E	75-68
19-3-73	3E	79-69
6-4-73	3E	77-67
24-4-73	3E	79-69
12-5-73	3E	79-69
30-5-73	3E	77-68
17-6-73	3E	81-69
5-7-73	3E	80-68
23-7-73	3E	80-68

10-8-73	3E	79-80, 68-69
3-10-73	3E	80-75, 71-72
21-10-73	3E	74-66
7-4-73	4E	77-67
24-4-73	4E	77-69
13-5-73	4E	78-68
31-5-73	4E	79-69
18-6-73	4E	80-67
6-7-73	4E	80-68
29-7-73	4E	80-69
11-8-73	4E	73-69
29-8-73	4E	73-70
16-9-73	4E	80-68
4-10-73	4E	80-72
22-10-73	4E	73-69
21-3-73	5E	80-67
8-4-73	5E	80-67
26-4-73	5E	77-67
14-5-73	5E	78-68
1-6-73	5E	77-72
19-6-73	5E	80-68
7-7-73	4E	79-69
25-7-73	4E	75-68
30-8-73	4E	76-69
17-9-73	4E	80-67
5-10-73	4E	74-65
23-10-73	4E	77-68
22-3-73	6E	78-68
22-4-73	6E	78-67
15-5-73	6E	80-68
2-6-73	6E	68-69
20-6-73	6E	80-65
8-7-73	6E	76-68
26-7-73	6E	80-69
31-8-73	6E	76-68
18-9-73	6E	80-69

6-10-73	6E	68-65
24-10-73	6E	69-67
28-4-73	7E	77-67
16-5-73	7E	80-69
3-6-73	7E	80-69
21-6-73	7E	80-65
9-7-73	7E	78-69
1-9-73	7E	79-69
7-10-73	7E	77-69
25-10-73	7E	69-68
4-6-73	8E	78-69
22-6-73	8E	75-65
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28-7-73	8E	75-68
2-9-73	8E	77-69
23-6-73	9E	78-73

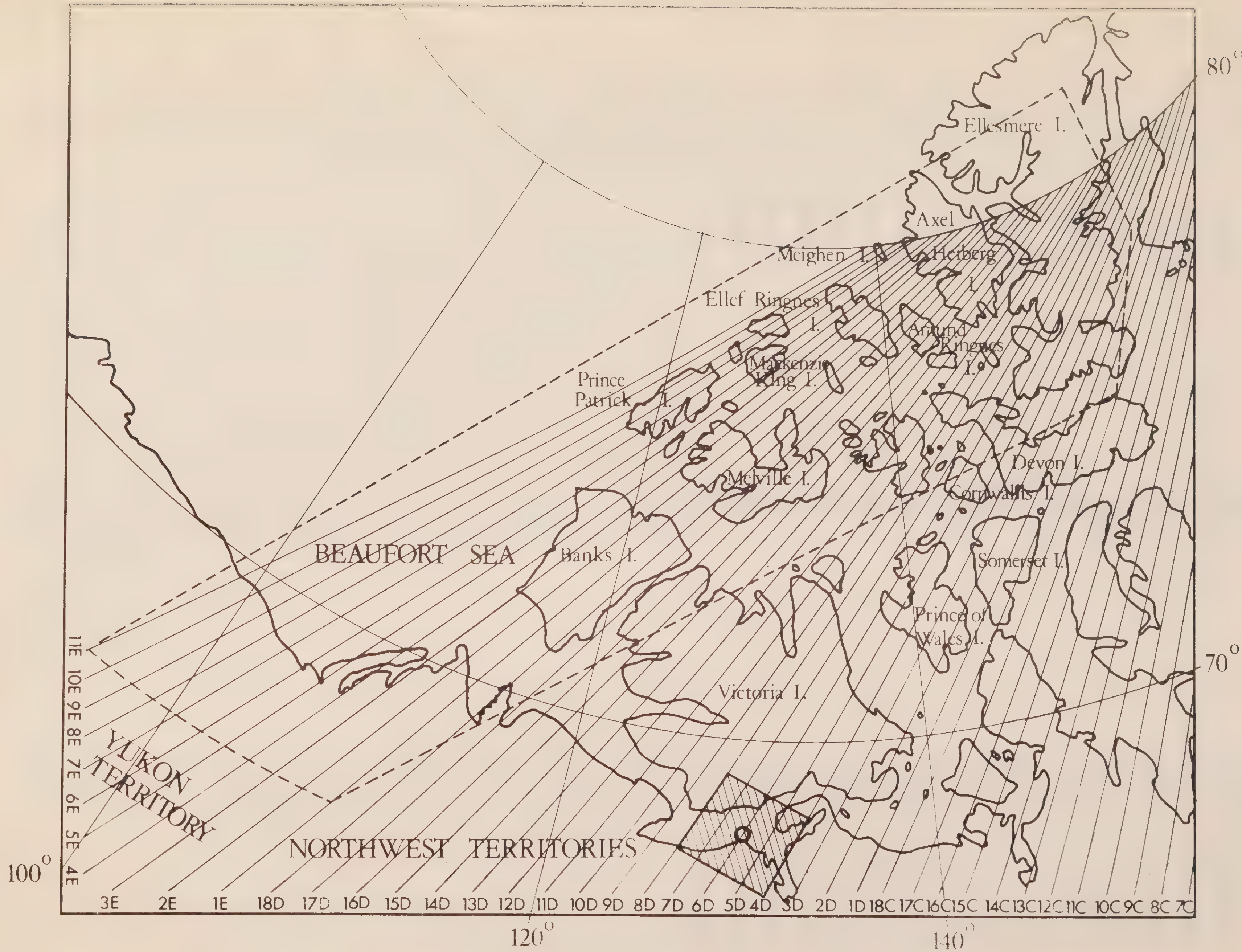

Figure 1 - The areas covered by accumulated ERTS-1 Quicklook imagery are outlined. This figure also includes the ground trajectories of the relevant orbits listed in Table 1.

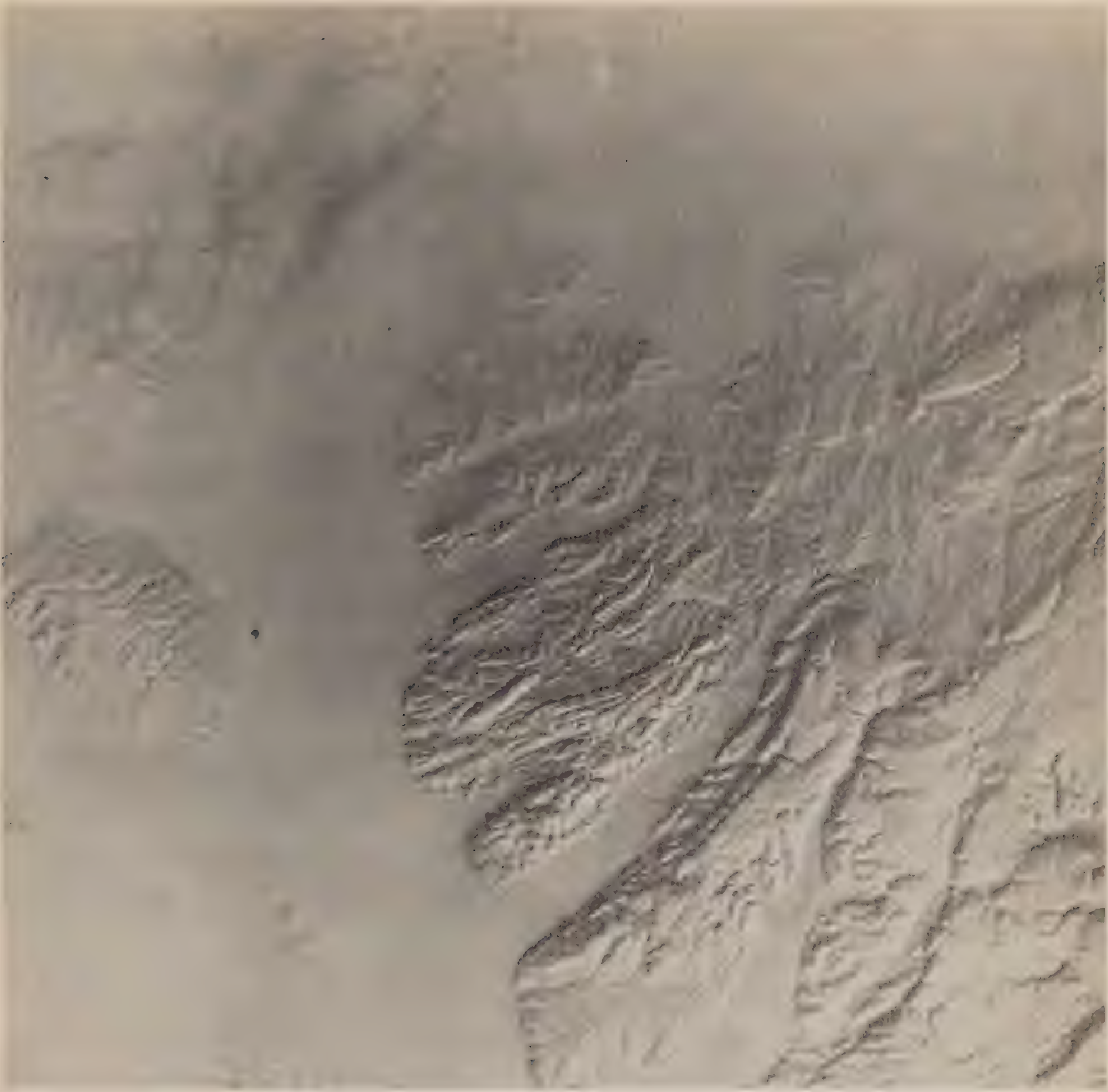

Figure 2a - ERTS-1 imagery of Eglinton, Prince Patrick and Melville Islands area for: 19-3-73.

Figure 2b - ERTS-1 imagery of Eglinton, Prince Patrick and Melville Islands area for: 18-6-73.

Figure 2c - ERTS-1 imagery of Eglinton, Prince Patrick and Melville Islands area for: 6-7-73.

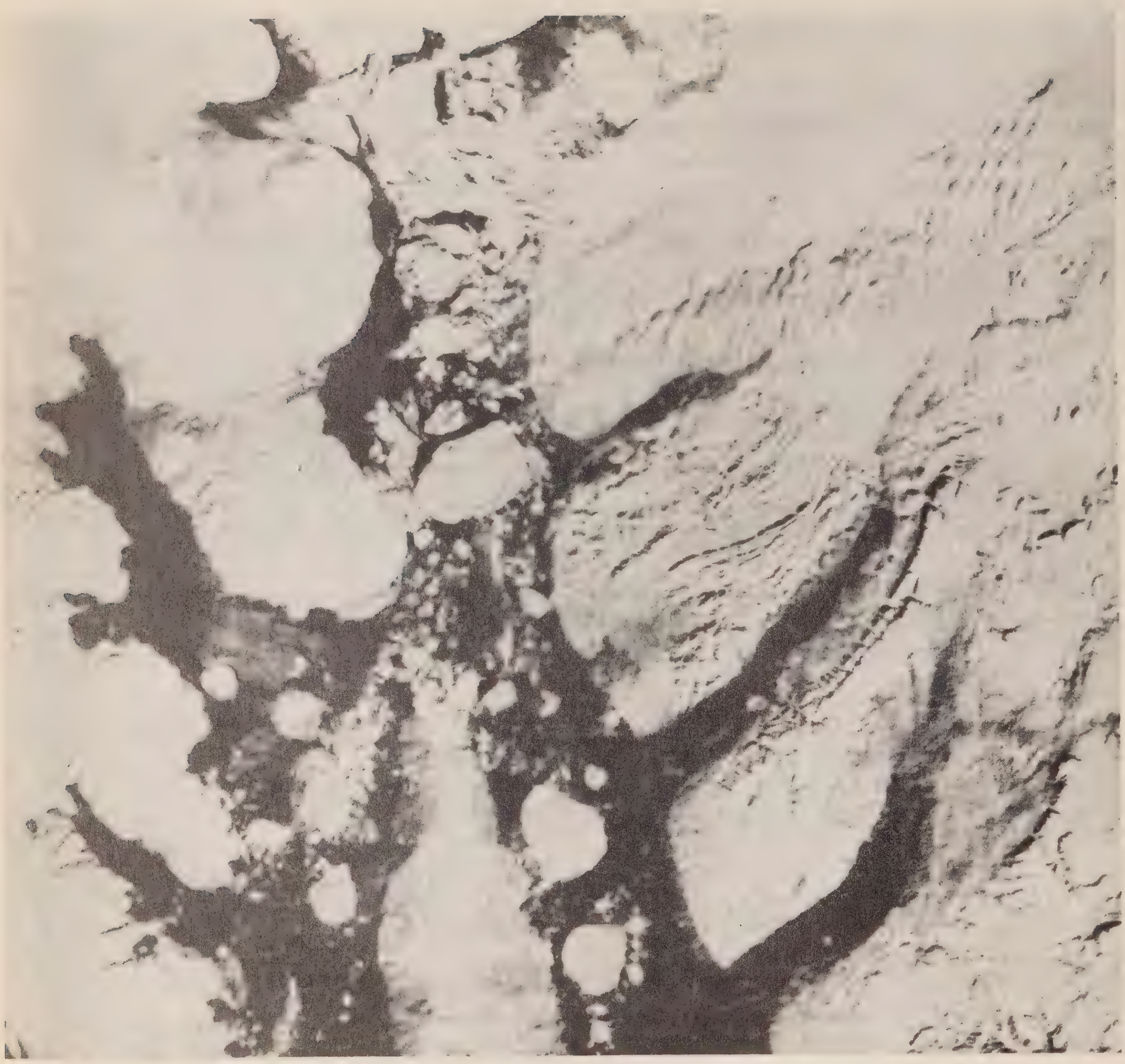

Figure 2d - ERTS-1 imagery of Eglinton, Prince Patrick and Melville Islands area for: 16-9-73.

Figure 2e - ERTS-1 imagery of Eglinton, Prince Patrick and Melville Islands area for: 3-10-73.

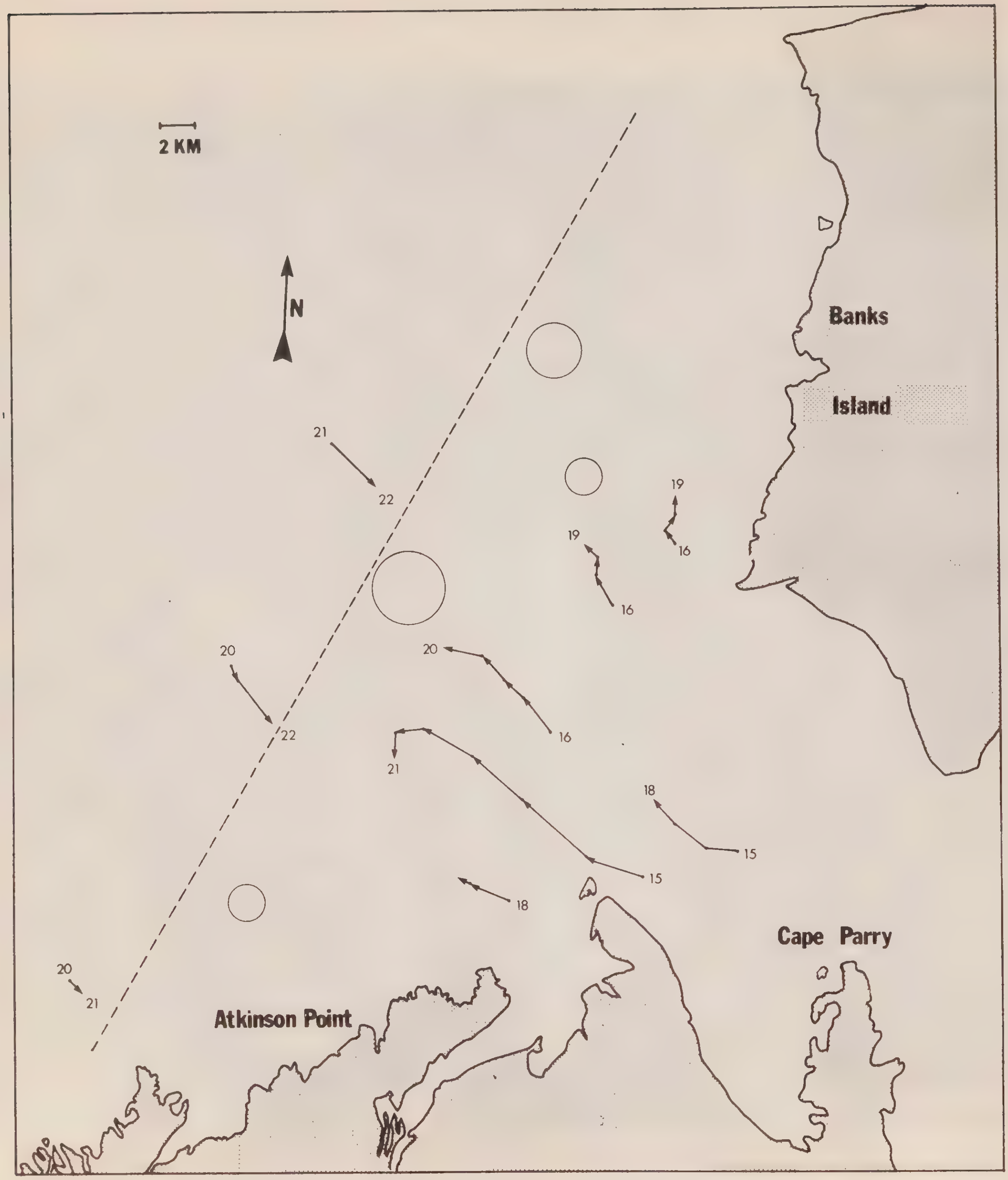

Figure 3a - The daily positions of several icefloes are plotted for a time period in June, 1973. The numbers in parentheses next to each resulting displacement vector sequence denote the corresponding initial and final days (of the month) for observation of a given floe. The uncertainties in these position determinations are represented by the circle and the approximate positions of the dense (9/10 to 10/10) central icepack are indicated by the broken line.

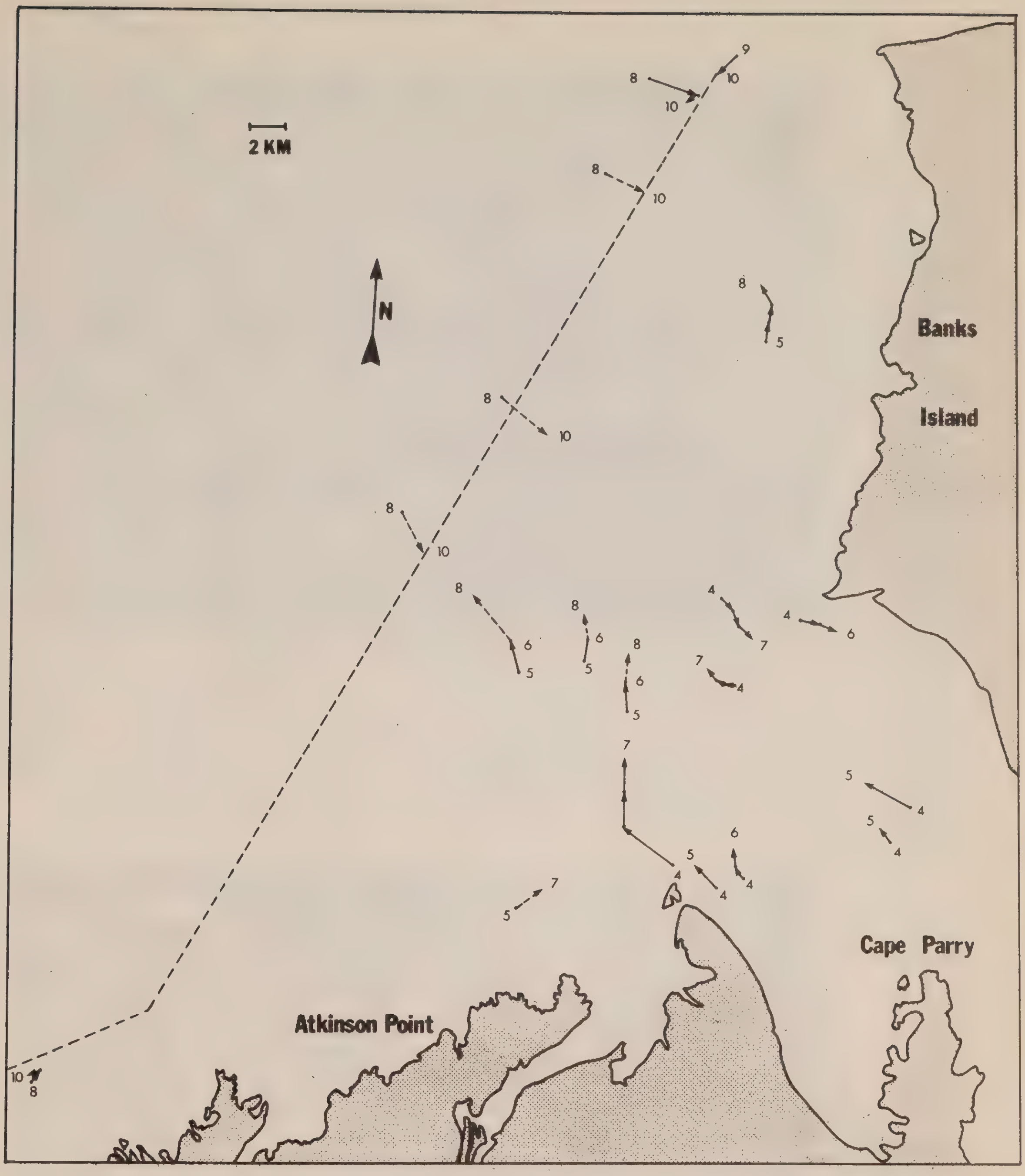

Figure 3b - The daily positions of several iceflows for a time period in July, 1973. Some daily positions are not included because of cloud-cover interruption of observations. The displacement vectors connecting the resulting pairs of 2-day separated points are depicted as broken in this figure.

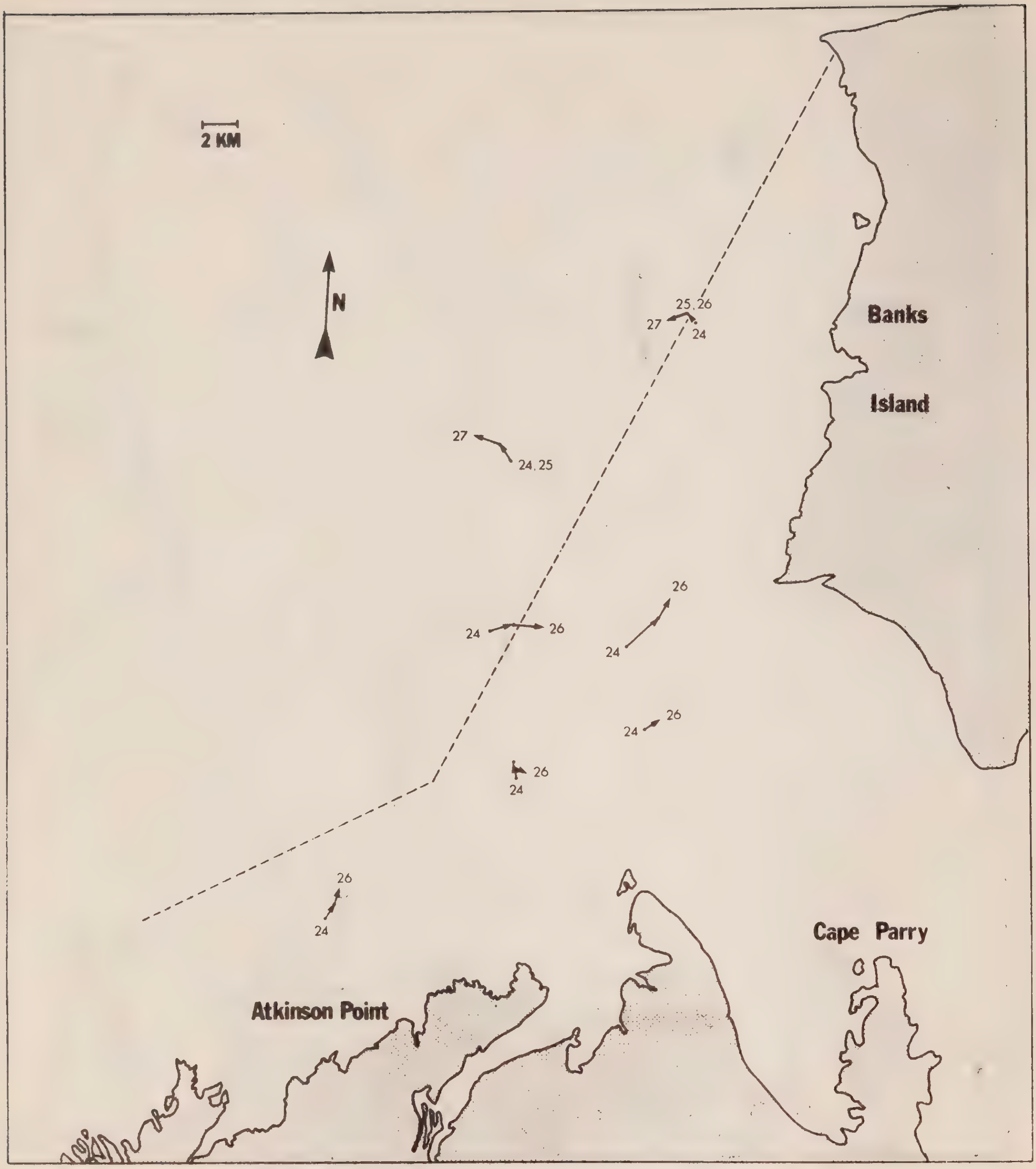

Figure 3c - The daily positions of several icefloes are plotted for a time period in August, 1973.

a b

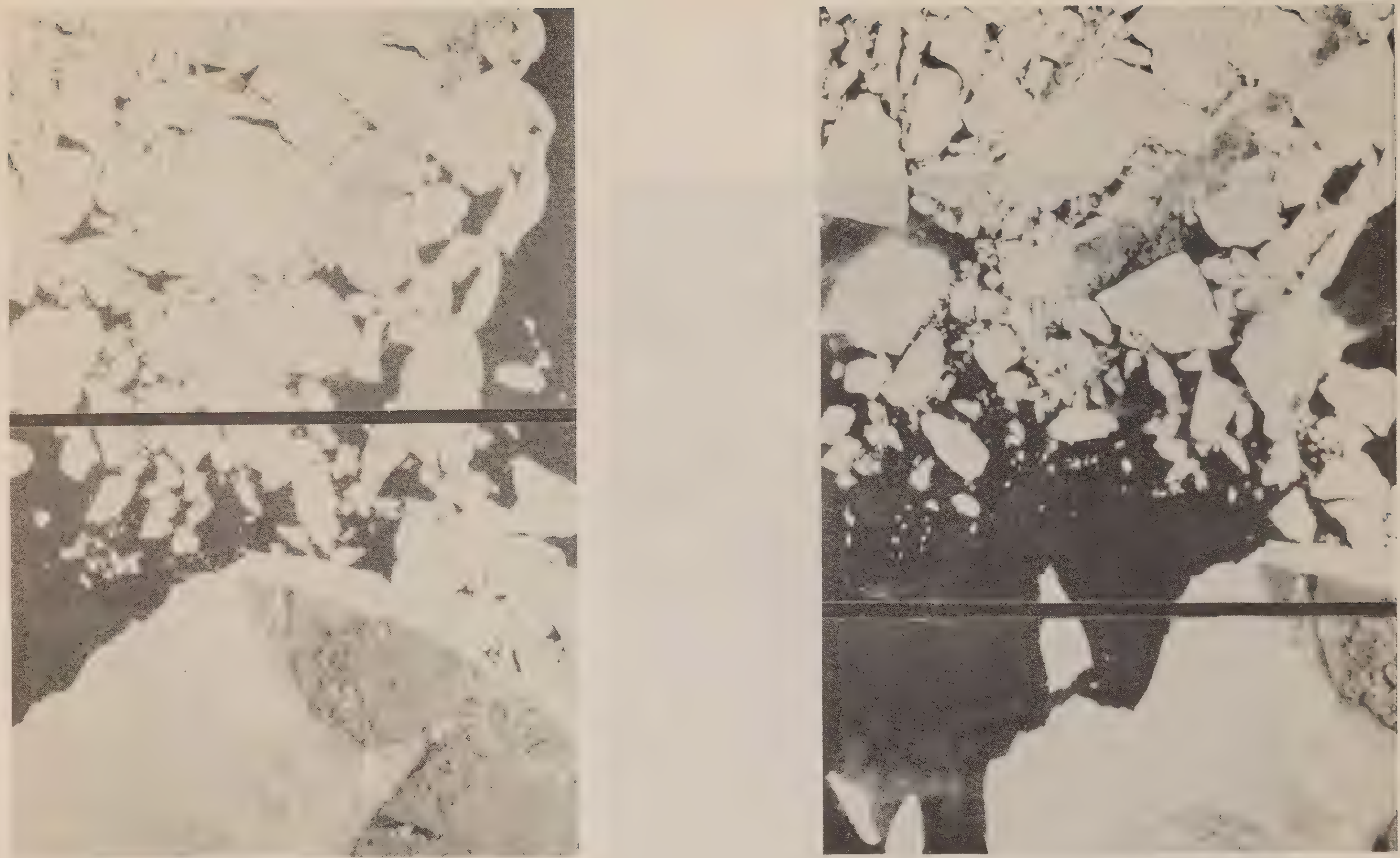

Figure 4 - These images of an area north of Point Atkinson were obtained on: (a) 16-6-73 and (b) 18-6-73. They illustrate the considerable scale of ice motion over this two-day period.

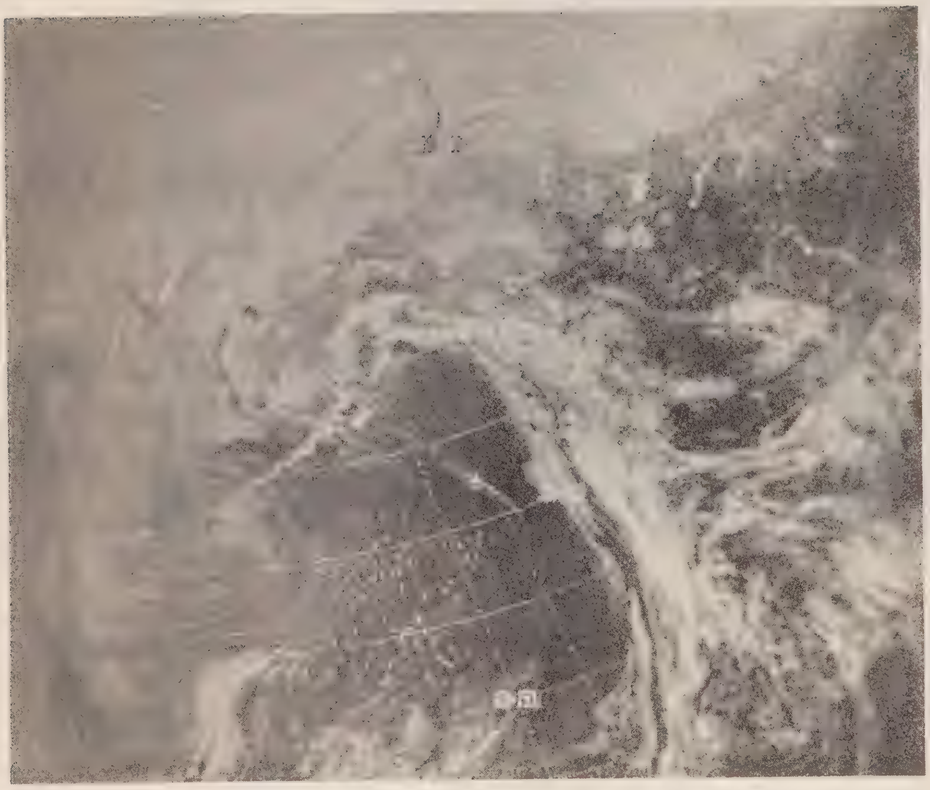

Figure 5 - A low resolution NOAA II satellite image (in the visible band) of North America on 9-4-73. The lead system referred to in the text appears centered approximately at 74°N, 129°W.

Figure 6 - The following images were obtained for an area off the western coast of Banks Island on (a) 30-8-73; (b) 31-8-73; (c) 1-9-73; (d) 2-9-73; and (e)17-9-73. Images (a) through (d) allow daily measurements of the rather slow ice motions while the comparison of (d) and (e) illustrates the relative constancy of the ice forms and configurations over longer periods of time.

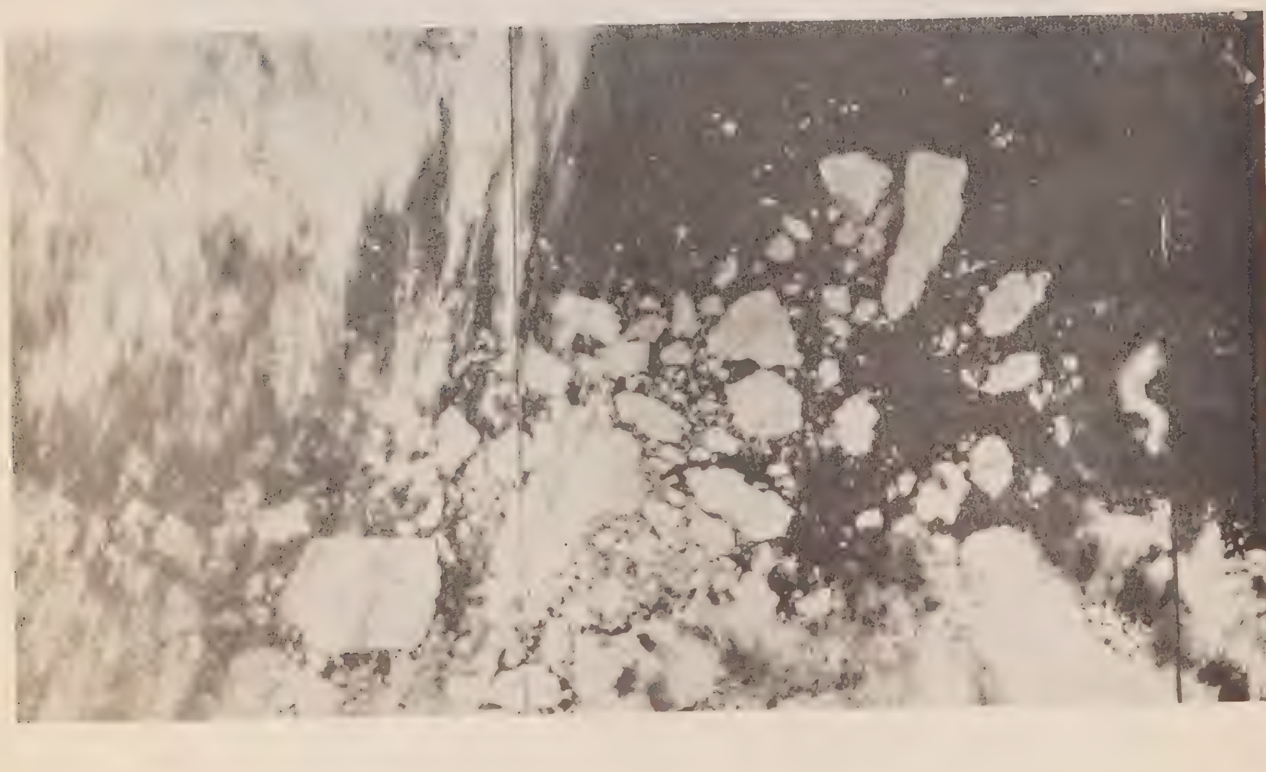

Figure 6a

Figure 6b

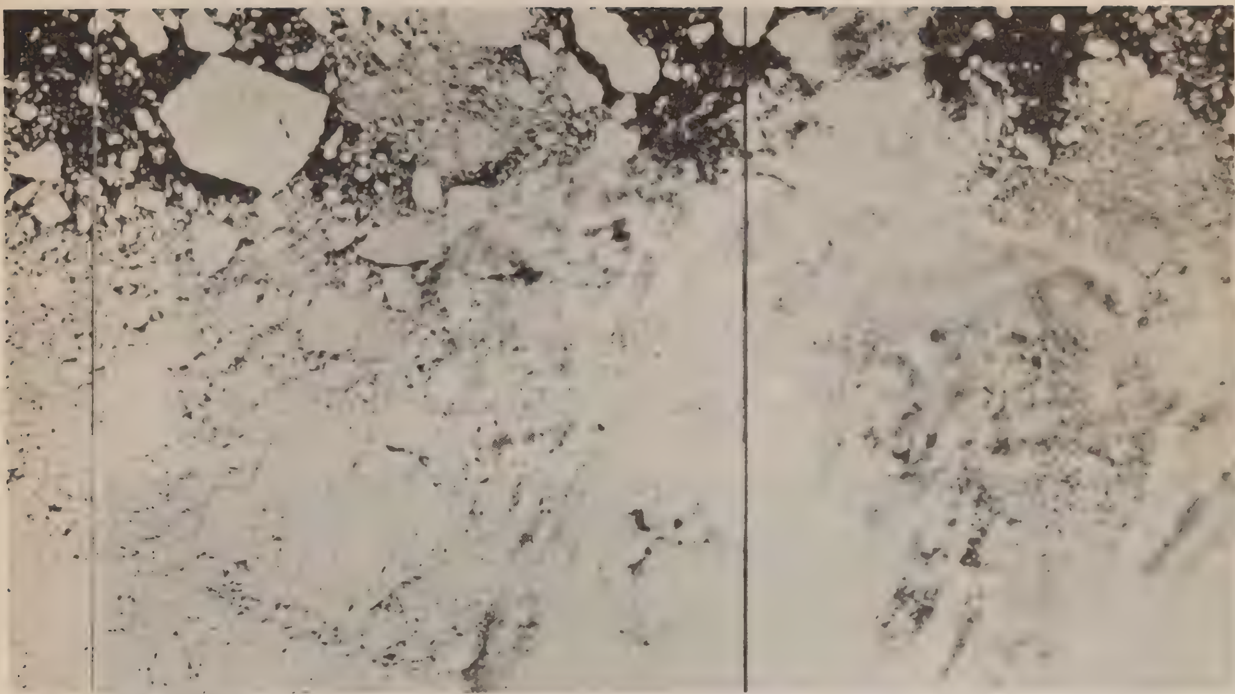

Figure 6d

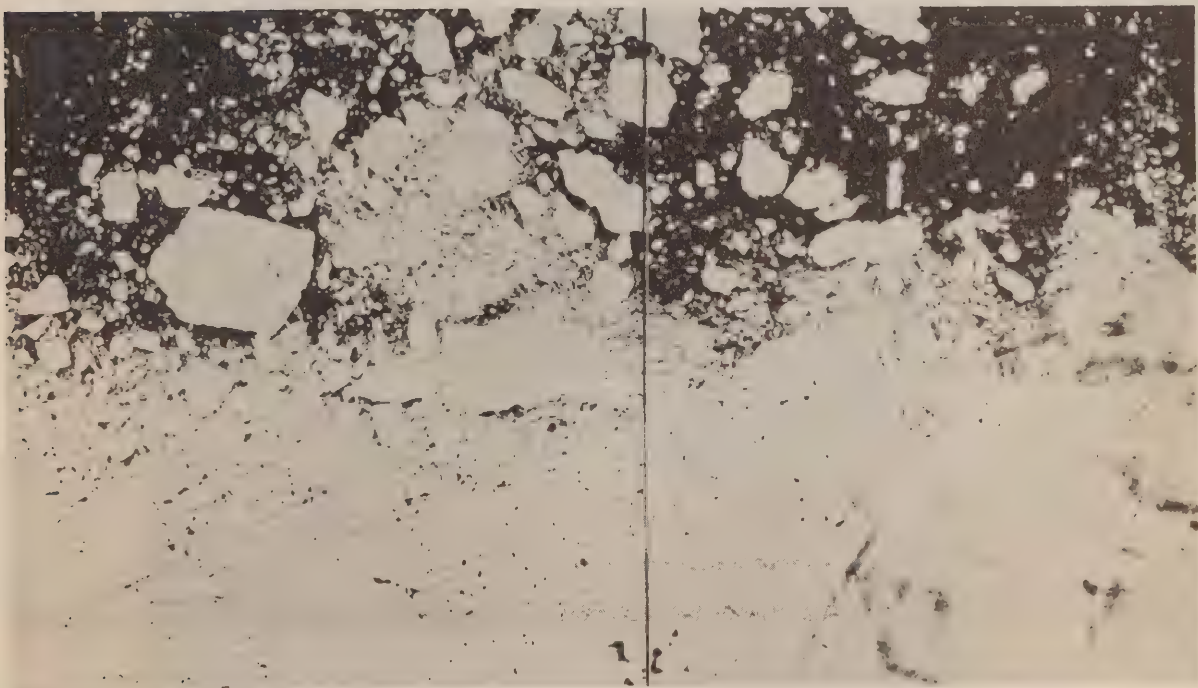

Figure 6c

Figure 6e

7a

7b

Figure 7 - The bright line in the shorefast ice which lies parallel to the coast of Banks Island in the 16-6-73 image (a) corresponds to a pressure ridge along which the later ice break-up occurs in (b) obtained on 6-7-73.

Figure 8 - These images were obtained on successive days, (a) 27-4-73 and (b) 28-4-73 for the portion of the extensive lead system which lies off the northwestern coast of Banks Island. Over the included time interval, the lead can be seen to have widened appreciably and the continued accumulation of new ice (which appears only slightly lighter than the dark open water) on its left-handside can be taken as evidence for a prevailing right-to-left surface wind.

Figure 8a

Figure 8b

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THE ALERT BAY OIL SPILL : A ONE- YEAR STUDY OF THE RECOVERY OF A CONTAMINATED BAY

D.R. Green, C. Bawden, W.J. Cretney and C.S. Wong

ENVIRONMENT CANADA
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ERRATUM

Page 14, line 10: 'electration' should read 'elutriation'.

MARINE SCIENCES DIRECTORATE, PACIFIC REGION

PACIFIC MARINE SCIENCE REPORT 74-9

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INTRODUCTION

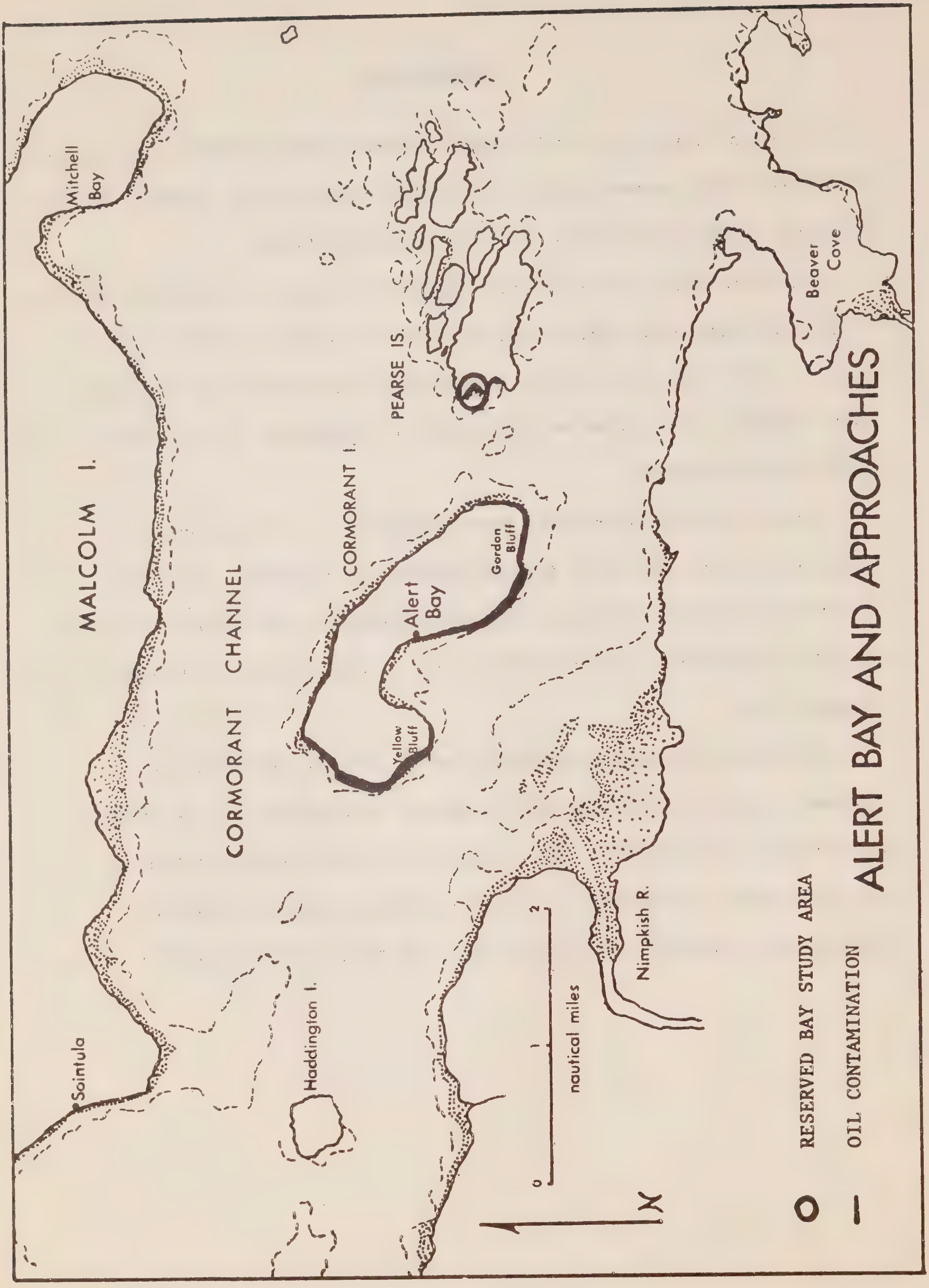
Late on January 24, 1973, the freighter Irish Stardust grounded on Haddington Reef rupturing two fuel tanks, and spilling roughly 200 tons of heavy '1000 second' fuel oil into Broughton Strait.

The majority of this oil was deposited along the shores to the east by the receding high tide on the morning of January 25 (high tide of 14.6'). The town of Alert Bay on Cormorant Island was the community most affected. The attached map shows the geography of the area and the most polluted beaches.

Major clean-up operations were conducted on the beaches of Cormorant Island and other islands further to the east. However, one of the more contaminated bays was sufficiently isolated that it could be left undisturbed for scientific study. This bay was code-named Reserved Bay.

The Ocean Chemistry Division, Marine Sciences Directorate, pursued a study of Reserved Bay to gather information on the natural degradation of heavy fuel oil. A series of five visits to the bay was made over the period of a year to obtain chemical samples, observe the physical fate of the oil, and follow its ecological effects.

FIGURE 1.


ALERT BAY AND APPROACHES
RESERVED BAY STUDY AREA
OIL CONTAMINATION
MALCOLM I.
Mitchell Bay
Sointula
CORMORANT CHANNEL
CORMORANT I.
Alert Bay
Gordon Bluff
Yellow Bluff
PEARSE IS.
Haddington I.
Nimpkish R.
Beaver Cove
nautical miles
0
1
2

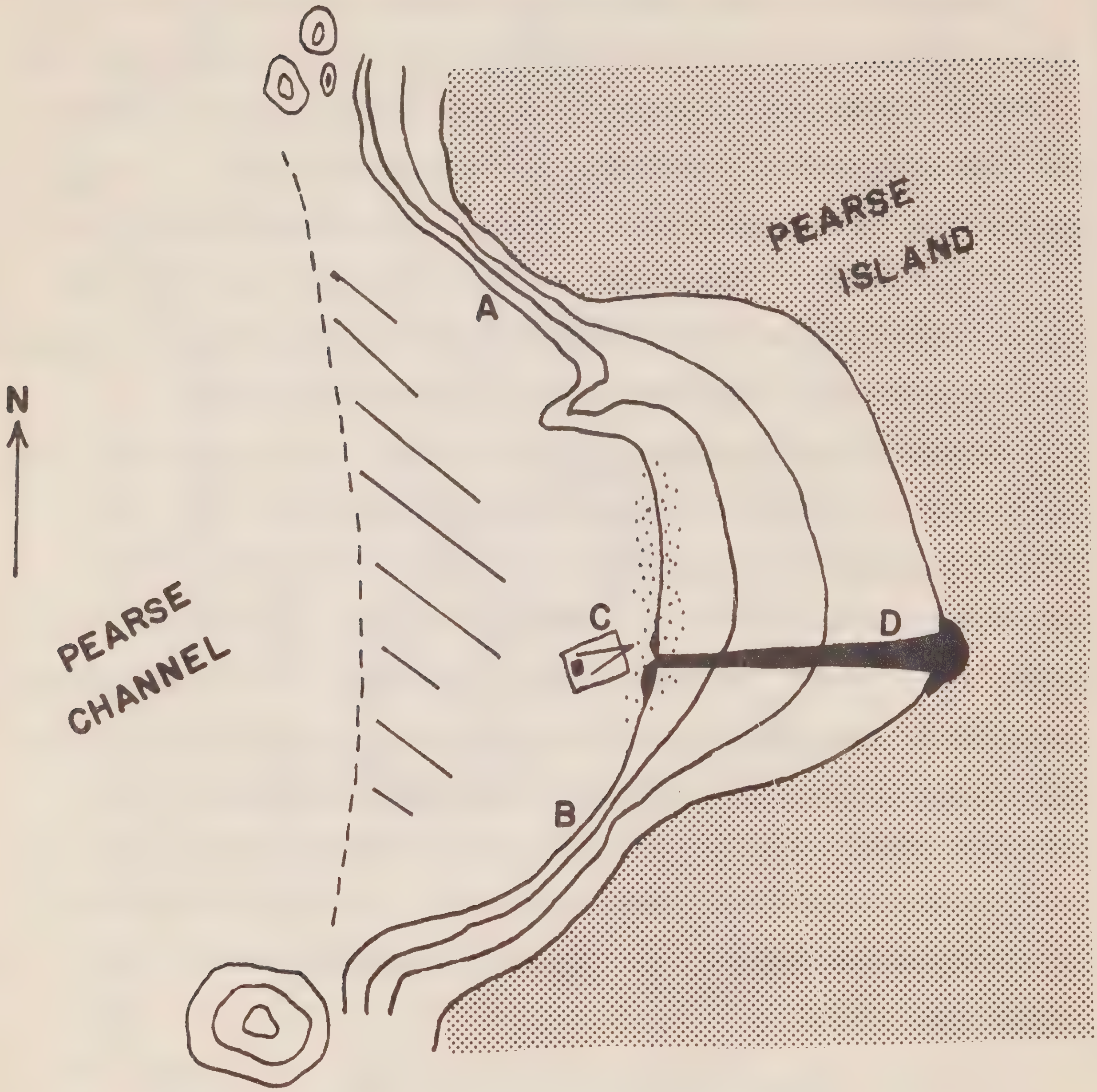
DESCRIPTION OF THE STUDY AREA

Reserved Bay is a semi-exposed bay situated on the west side of the largest island of the Pearse group (see Fig. 2). The north and south sides of the bay are bounded by vertical rock faces five to ten feet in height. Its head is bordered by a lowland of meadow and marsh grasses. A small stream flows onto the south end of the beach. The low-tide zone consists of a clay-based mudflat; the mid-tide zone of stone, sand, and pebble areas; and the high-tide zone of rock faces and patches of sand, stone, and pebbles. The area surrounding the stream is mostly a sand-clay mixture.

Rockweed (*Fucus distichus*) extends from high to mid-tidal areas. The low-tide mudflat harbours eelgrass beds (*Zostera marina*). Brown algae (*Alaria marginata* and *Laminaira sp.*) grow on logs which are partially embedded in the mud. Mud holes suggest the presence of clams, polychaete worms, and/or shrimp. Barnacles (*Balanus glandulus*), shore crabs (*Hemigrapsus nudus* and *H. oregonensis*), amphipods (*Orchestia sp.*), periwinkles (*Littorina sitkana* and *L. scutulata*), and turban snails (*Calliostoma sp.*) frequent mid-tidal areas; while the latter three and the limpets (*Acmaea spp.*) are the prominent fauna in the higher tidal zones. A peculiar characteristic of the bay is the absence of the typical scattering of barnacles at the higher tidal levels.

In general, this species composition is typical of intertidal life in a British Columbia semi-exposed habitat. Also, the physical characteristics of the bay are common to thousands of inlets and bays along the complex coastline of British Columbia and Alaska. Reserved Bay, then, provides a good 'case study' of the environment which would be affected by an oil spill on the west coast.

Figure 2. Reserved Bay Study Area



LEGEND

A: northern rock face — marsh grass

B: southern rock face — mudflats

C: abandoned logging winch — --- low tide mark

D: stream — island

contour lines are at two foot intervals

FIELD METHODS

Reserved Bay was visited five times over a one-year period as follows:

January 24, 1973	Grounding of Irish Stardust
January 25	Oil contamination of Reserved Bay
January 30	First visit, five days after spill
March 9	Second visit, six weeks after the spill
June 5	Third visit, four and a half months after the spill
August 28	Fourth visit, approximately eight months after the spill
January 26, 1974	Fifth visit, one year after the spill

On each visit the same general procedure of observation and sampling was followed. The ensuing paragraphs detail this procedure.

Observation of the Oil:

The physical appearance of the beach and the extent of oil contamination were described. To complement the written description and objectively record the appearance of the beach, a series of colour photographs was taken.

Chemical Sampling:

Samples were taken down the beach from the heavily contaminated upper tidal area to the apparently clean lower area, and further samples were taken of the various contaminated substrates (sand, gravel, rockweed and rock face) and of oil floating as a slick. They were stored in tightly-capped brown bottles and frozen upon arrival at the laboratory.

Biological Observations and Sampling:

On the first visit, there was no biologist present, so unfortunately no assessment was made of the effect of the oil on the intertidal life.

For the remaining visits, the biological program included:

a) a general description of the biological state of affairs

b) a transect down the beach

c) core sampling for meiofauna (benthic animals less than one mm largest dimension).

The following section gives the general observations recorded for each visit.

OBSERVATIONS

FIRST VISIT

January 30, 1973
1000-1400
Tides: High of 14.3 ft. at 1005
Low of 4.4 ft. at 1740
Five days after spill

Visual Observations:

There was an oily sheen on the surface waters of the cove. Oil-soaked material and thick black patches of oil were observed near the beach.

The receding tide revealed the following oil pollution in the cove above the mid-tide mark:

Northern rock face to logging winch:A band of oil covered a vertical height of approximately five feet downwards from the high tide mark. Coverage was continuous over rocks, rock faces, logs and sea weed, with a coating 1 to 5 mm thick. The sand was oily but not coated. A thick bed of detached, heavily-oiled rockweed (*Fucus distichus*) covered the high-tidal area at the head of the beach. The sand beneath was not oiled.

Logging winch to south rock face: Trace amounts of oil only.

South rock face: Oil coating was present but not continuous (approximately 25% coverage in the five foot contamination band).

Below mid-tide, the beach and rock faces appeared to be totally oil-free.

SECOND VISIT

March 9, 1973
1030-1500
Tides: Low of 3.4 ft. at 1030
High of 12.9 ft. at 1635
Six weeks after the spill

Visual Observation:

The areas of beach and rock affected by the oil were unchanged from the first visit. No migration of oil down the beach or to adjacent unoiled areas had taken place.

The oil was perhaps less glossy and less sticky than on the first visit, but not markedly so. The coating of oil on the rockweed appeared to be thinner and more evenly spread. However, in general appearance, the oil looked very much as it had two months before.

Biological Observations:

Marsh grasses on the eastern head of the beach were heavily oiled, although surrounding sands were clean. The northern head of the beach was thickly covered with oiled, unattached rockweed (*Fucus sp*.). Removal of the algae revealed clean sands harbouring many active amphipods (*Orchestia sp*.). Attached, unoiled plants further down toward the mid-tidal zone were healthy in appearance.

At the foot of the northern rock face, oil was very thick among the rocks. Among the rocks, many oil-covered amphipods were found. Most were alive (slow, restrained movements) while smaller numbers exhibited no movement at all.

Many empty, unweathered limpet shells (*Acmaea spp*.) were found lying

at the base of oiled rock faces, suggesting a heavy kill of these animals by oil contamination. For example, forty-two recently dead limpets were found at the base of a heavily oiled rock face one square metre in area. The northern rock face, which was well oiled, was almost devoid of limpets ($\sim 2/m^2$) while southern rocks, with only patchy oil coverage, harboured much greater populations ($\sim 50/m^2$).

Most periwinkles (Littorina spp.) found under oiled rocks in the upper tidal zones were lying free on the ground with their opercula tightly in position.

The faunal and floral populations of the unoiled mid- and low-tidal area appeared to be unaffected.

Comment:

Biological damage appeared to be limited to those flora and fauna smothered by the oil. Populations of animals and plants living near, but not directly contaminated by the oil appeared to be healthy and normal.

The action of waves and tides had not altered the pattern of contamination of the cove in any way.

The natural degradation processes appeared to be very slow. The oil had much the same visual appearance and properties as on the first visit six weeks earlier.

THIRD VISIT

June 5, 1973
0930-1230
Tides: Low of 1.4 ft. at 1040
High of 13.6 ft. at 1710
Four and one half months after the spill

Visual Observations:

The oil occupied the same areas of the intertidal zone as before. It was less sticky and glossy-looking, with a dull, black, asphalt-like appearance.

Closer examination showed that the oil still stuck to hands and feet, still leached a film of oil into the water, and still appeared fresh and glossy in crannies or under rocks.

Biological Observations:

Unattached oiled beds of rockweed still lay at the eastern head of the beach. The oil covering had weathered somewhat, and the plants were in a desiccated condition. More rockweed beds (unoiled) had recently been cast up approximately one metre below the oiled beds. The moist sand substrate beneath the rockweed harboured numerous healthy amphipods.

Nearly all limpets had died and fallen off heavily oiled rock faces. The few remaining appeared to be successfully grazing on the oiled rock.

FOURTH VISIT

August 28, 1973
1130-0100 (+7)
Tides: Low of 1.7 ft. at 0715 (+8)
High of 15.2 ft. at 1330 (+8)
∿ Eight months after the spill

Visual Observations:

Oil was still very evident along the rock faces and on the rock and gravel portions of the affected beach. It was not present in the sand.

The oil had lost most of its sticky, contaminating properties and was very asphalt-like in appearance. However, fresher-looking oil could still be found under rocks. Oil still leached a surface slick on to the advancing tide wherever the beach had been disturbed and the fresher oil revealed.

Biological Observations:

Oil coverage of marsh grasses on the extreme eastern head of the beach was more weathered and plants were no longer stuck together in clumps. The grasses appeared to have been scoured free of some of the oil (perhaps sand scour). Surrounding sands were clean.

About half of the bed of oiled rockweed had disappeared. All plants were well weathered and dried.

A very high density amphipod population existed under the rockweed wherever dampness persisted, (∿ 1000 or more amphipods per square meter). Under-rock areas near quadrat 1 harboured many large amphipods (a few small amphipods as well) in spite of a sticky, oiled substrate.

The oiled rock faces did not have any significant recolonization of limpets or littorinids. Southern rock faces described as relatively unoiled at the time of the spill, still had approximately the same species composition and abundance as described in Visit 2.

FIFTH VISIT

January 26, 1974
0930-1130
Tides: Low of 6.7 ft. at 0900
High of 14.9 ft. at 1440
One year after the spill

Visual Observations:

A superficial examination indicated the oil had disappeared. It was no longer evident on the small stones of the beach; and on the rock walls the dark stains of the oil were nearly gone. No oil was evident in the sand; and the oiled rockweed at the high tide line had completely disappeared and been replaced by fresh rockweed debris.

Closer examination clearly revealed coagulated oil immobilizing the gravel on the most heavily affected portion of the beach. However, there were no pockets of fresh oil still hidden among the rocks, and the oil present had almost completely lost its sticky contaminating nature. Rocks and gravel could be handled without the need for plastic gloves.

Visually, then, the cove appeared much cleaner, but oil was still present in the gravel and an unobtrusive thin black coating was present on rocks in some places.

Biological observations:

Biological conditions had undergone noticeable change with respect to previous visits. Oiled marsh grass stands on the north head of the beach, previously observed to be 15-25 cm high, were now about three to five cm high. Similar marsh grass stands on the southern beach head, which were not contaminated by oil, were growing in lenghts of 15-30 cm. Apparently the marsh grass had been affected by the oil.

The beds of unattached, oiled rockweed had disappeared and new beds had been washed up. Few amphipods were found in these new rockweed beds. However, the base of the northern rockwall harboured very high numbers of small to large-sized amphipods. Limpets had not yet begun to recolonize the northern rock face but were beginning to recolonize smaller rock faces a few metres away. Periwinkles were found under rocks in areas previously devoid of them.

BIOLOGICAL EFFECTS

In addition to the general biological observations already described, more quantitative data were obtained from transects and by analyzing sand cores for meiofauna (benthic animals less than one mm in length). The methods and results are discussed below.

METHODS OF ANALYSIS AND RESULTS

Meiofauna Sampling:

At each station, a glass tube (four cm in diameter) was inserted 1.5 cm into the substrate and removed with a core inside. The core was then preserved with four percent formalin in sea water.

Animals were separated from the sand by electration. Faunal divisions classified and enumerated were:

1. Nematodes - (Phylum Aschelminthes)
2. Annelids - (Phylum Annelida)
3. Copepods - (Phylum Arthropoda)
4. Amphipods - (Phylum Arthropoda)
5. Ostracods - (Phylum Arthropoda)

Other organisms found in the samples were generally too few in number to be of significance, or too small to be identified (eg. foraminifera).

Sampling areas were dictated by the availability of suitable sand substrates. Coring stations fell in a line down the shore, beginning below the northern rock face.

The results of the sampling are presented as a table on the next page.

TABLE I

MEIOFAUNA SAMPLING--RESULTS

Visit/Date	Core Station	Substrate Grain Size	No.'s of Organisms per Core Sample Nematodes	Annelids	Copepods	Amphipods*	Ostracods
2-9/3/73	1	Fine	620	80	118	-	160
	2	Coarse	-	38	10	-	62
4-28/873	1	Fine	165	262	4	-	174
	2	Fine	1282	220	14	-	34
	3	Fine	615	112	160	-	100
5-26/1/74	1	Fine	227	72	66	13	31
	2	Medium Fine	163	11	40	18	90
	3	Fine	780	160	25	50	41

*<u>Anisogammarus</u> <u>Sp</u>.

Transect Method

During visits 3, 4, and 5 a transect was run on a perpendicular from the rock wall below benchmark B toward the lower tidal area. Quadrats were placed at one metre intervals along the transect, quadrat 1 situated at the base of the wall. Quadrat size was 30 square cm. Recorded for each quadrat were: organisms present, numbers of organisms, percent composition of substrate, and visual presence or absence of oil. The data from these transects are given in the following tables.

THIRD VISIT

QUADRAT NUMBER	OIL PRESENCE	% COMPOSITION OF SUBSTRATE			FLORAL COVERAGE	LIMPETS (Acmaea Spp.)		LITTORINIDS		AMPHIPODS		OTHER
		Rock	Pebble	Sand		Living	Moribund or Dead	Living	Moribund or Dead	Living	Moribund or Dead	
1	Oil at base of rocks, weathered oil on rocks	90	-	10	-	-	1	2	3	-	-	1 crab (Hemigrapsus oregonesis)
2	Weathered on rocks	75	20	5	-	-	8	7	20	-	-	
3	No visible oil	55	25	20	5 (Gigartina)	-	-	26	2	-	-	
4	No visible oil	30	20	50	2 (Fucus) 4 (Gigartina)	2	1	11	3	-	-	
5	No visible oil	5	-	95	3 (Fucus)	-	-	17	-	-	-	
6	No visible oil	40	15	45	4 (Fucus)	8	-	21	5	-	-	
7	No visible oil	55	45	-	-	7	-	36	-	-	-	
8	No visible oil	-	5	95	4 (Gigartina)	-	-	3	-	-	-	

FOURTH VISIT

QUADRAT NUMBER	OIL PRESENCE	% COMPOSITION OF SUBSTRATE			FLORAL COVERAGE	LIMPETS (Acmaea Spp.)		LITTORINIDS		AMPHIPODS		OTHER
		Rock	Pebble	Sand		Living	Moribund or Dead	Living	Moribund or Dead	Living	Moribund or Dead	
1	Weathered on rocks - sticky tar on sands	80	-	20	-	-	2	2	1	1	-	
2	Weathered on rocks - sticky tar(slight) on sand	70	15	15	-	1	6	14	12	-	-	
3	Weathered on rocks - not visible in surface sands	30	55	15	-	2	1	1	2	-	-	
4	Small amount weathered on rocks	-	30	70	2 *Gigartina sp.* plants Very Desiccated	-	-	4	3	-	-	1 *Hemigrapsus nudus* living
5	No visible oil	85	10	5	1 *Gigartina sp.* plant	4	-	5	2	-	-	
6	No visible oil	10	10	80	1 Large *Fucus sp.* plant	-	2	25	-	-	-	
7	No visible oil	10	20	70	80% coverage of *Fucus sp.* 1 young *Gigartina sp.*	-	-	28	2	-	-	
8	No visible oil	70	15	15	1 young *Gigartina sp.*	7	-	4	2	-	-	

FIFTH VISIT

QUADRAT NUMBER	OIL PRESENCE	% COMPOSITION OF SUBSTRATE			FLORAL COVERAGE	LIMPETS (<u>Acmaea</u> <u>Spp</u>.)		LITTORINIDS		AMPHIPODS		OTHER
		Rock	Pebble	Sand		Living	Moribund or Dead	Living	Moribund or Dead	Living	Moribund or Dead	
1	Tarry residue in sand around rocks. Weathered oil on rock	60	40	-	1 <u>Fucus</u>	-	2	20	7	~100	-	
2	Weathered oil on rock	50	50	-	-	1	2	75	20	~100	-	2 barnacles
3	No visible oil	40	60	-	1 <u>Gigartina</u>	1	-			-	-	encrusting brown algae (0.05%coverage)
4	No visible oil	-	10	90	-	-	-	1	1	2	-	
5	No visible oil	75	25	-	1 <u>Gigartina</u>	13	-	60	10	30	-	
6	No visible oil	-	5	95	-	-	-	5	-	10	-	6 barnacle
7	No visible oil	20	80	-	1 <u>Fucus</u>	5	2	20	-	-	-	8 barnacle
8	No visible oil	-	5	95	-	-	-	-	-	5	-	-

Transect Results

Of the organisms identified during this study, the most numerous were:

Algae:	*Fucus distichus* (rockweed)
	Gigartina sp.
Molluscs:	*Acinara spp.* (limpets)
	Littorina scutulata } (periwinkles)
	L. sitkana } (periwinkles)
	Calliostoma sp.
Crustacea:	*Orchestia sp.* (amphipods)

The population numbers of these species remained fairly stable throughout the study with the exception of the amphipods. Table 5 summarizes the change in amphipod numbers over time.

TABLE 5

TRANSECT STUDY: AMPHIPOD NUMBERS/TIME

Quadrat No.	Visit Number		
	3	4	5
1	-	1	~100
2	-	-	~100
3	-	-	-
4	-	-	2
5	-	-	30
6	-	-	10
7	-	-	-
8	-	-	5

DISCUSSION OF BIOLOGICAL EFFECTS

Introduction:

This is not a before and after study. There are no data or observations of the conditions of the biota before the spill. Therefore, comment can only be made as to how the after-spill conditions in Reserved Bay differed from other similar but uncontaminated areas, and how populations have changed over time since the spill occurred. A further limitation is that only lethal and obvious physical damage to the biota have been studied. Long-term sub-lethal effects have not been assessed.

General Observations:

The area physically covered by the spill was the upper tidal zone, and consequently populations in this area were the most affected.

Marsh grasses at the upper limits of the spill experienced physical damage. Parts of the plant which were covered with oil (upper stems) were lost. It is not uncommon, however, for winter storms to similarly reduce marsh grasses to near-ground level, with extensive spring and summer growth restoring the aerial parts of the plant. Therefore, rejuvenation can be expected, and in fact the damage to the grasses may have been natural.

It is a common occurrence for large amounts of rockweed to be tossed into the higher tidal reaches. The bed of detached rockweed observed at the top of the beach was almost certainly there before the spill, and then was oiled; almost rather then being oiled in the living state, detaching and washing ashore. However, some rockweed damage did occur due to the spill. The few attached plants in the oiled area of the beach became

desiccated and moribund, presumably because oil coverage prevented light absorption and gas exchange.[1]

Heavy densities of amphipods were observed in the detached bed of oiled rockweed. This is a common occurrence in a bed of decaying algae, and probably not a manifestation of the oil covering.

The group of animals most obviously affected by the oil coverage were the grazers: limpets and periwinkles. Many dead and moribund periwinkles were found in oiled areas on the second visit and they did not reappear there until visit 5. The northern and southern rock faces provided a clear comparison for limpets: the northern was well oiled, the southern relatively unoiled. Southern rock faces sustained high densities of limpets ($\sim 50/m^2$) throughout the study, while the oiled northern rock face was nearly devoid of them ($\sim 2/m^2$). It is apparent that the oil coverage sharply reduced the limpet numbers. This statement is supported by the fact that large numbers of recently dead limpets were found at the base of the northern rock face and at the base of other oiled rocks.

Meiofauna in Sand Cores:

The core samples contained meiofauna which are characteristic of a marine sandy environment (Bawden et al, 1973). There were relatively stable numbers of all members of the meiofauna except the amphipods(Table 5).

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[1]These beds of rockweed retain the oil, keeping it from the sand surfaces beneath. This contradicts observations made on a Bunker C oil spill by Thomas (1973). Thomas indicated that species of rockweed were protected from oil coverage by a mucilaginous surface layer. The rock weed found in Reserved Bay (Fucus distichus) appeared to retain rather than repel oil coverage.

Virtually no amphipods existed in the cores from Visits 2 and 4, with a sudden appearance of substantial numbers in cores from Visit 5. This could reflect a recovery of the population from the effects of oil (perhaps recolonization from other tidal levels). On the other hand, it could also reflect a seasonal habitat preference of various stages in the life cycle of this particular organism (Orchestia sp.). Whatever the explanation the meiofauna appear to be a healthy and diverse community that were not devastated by the effects of the oil.

Transects:

Transect studies also reveal fluctations in amphipod densities while the densities of other organisms are relatively stable. Visits 3 and 4 record very few amphipod numbers, while Visit 5 demonstrates a significant rise in numbers, particularly in the higher tidal levels. The fact that this recolonization consisted of both large and small amphipods indicates that this is not a recently hatched brood which has taken over since the spill, but rather a group of animals which has moved in from unaffected areas and taken up residence in the oiled habitat.

Conclusion:

Of the biotic community in Reserved Bay, only the organisms actually covered with oil appear to have been significantly reduced in numbers. However, many of these animals have vertical zonal distributions which extend into uncontaminated areas and, therefore, have the chance for fairly rapid recolonization. Once the oil has weathered sufficiently, adult animals may move directly into the affected areas, or young larval stages may settle out of the plankton. Natural recovery of the damaged areas should not be difficult. Considering the limited size of the spill, and the

natural resiliency of marine biological communities, there should be no permanent damage to the biota of the bay.

CHEMICAL STUDY

Method of Analysis

Oil samples from each visit to Alert Bay were analyzed by gas chromatography to determine the chemical changes that occurred to the oil due to the effects of weathering.

Roughly one gram of material was weighed out from each sample into a centrifuge tube. Five ml of carbon disulfide were added and vigorously shaken to dissolve the oil. The tube was then centrifuged to remove particles of sand and other foreign material, and the CS_2 solution was decanted into a glass septum vial (teflon septum). These vials were kept refrigerated when not in use.

The samples were analyzed by gas chromatography using two different kinds of columns. First the sample was run on a Dexsil column. Dexsil 300 is a non-polar, high-temperature packing which can be programmed up to $400^{o}C$ with very little bleed. This gave a full chromatogram of the oil sample on a stable baseline.

Secondly, a partial chromatogram of the sample was obtained running the sample on a FFAP column. FFAP is a polar packing, and it was used to separate the isoprenoid peaks (pristane and phytane) from the corresponding paraffin peaks (C_{17} and C_{18}).

The significance of these peaks will be made clear shortly.

Results

The results of the gas chromatographic analysis are given on the following pages in two sections, the first presenting the full chromatograms, the second presenting the isoprenoid/paraffin ratios. In both, the traces proceed chronologically from the original spilled oil through to the samples

from the final visit.

The spectrum of peaks in the full chromatograms reflects the concentration of paraffinic compounds, the main components of oil. The numbering indicates the number of carbon atoms in the compound creating the peak. Thus the area under the peak labeled '15' corresponds to the amount of pentadecane in the sample.

Technical Data - Gas Chromatography Procedure

Full (high-temperature) chromatograms:

A Varian Aerograph 1400 gas chromatograph was used for this portion of the work. The working parameters were as follows:

Sample size: 5 to 40 μl Carrier gas: N_2
Column: length 10' by 1/8" diameter
3% Dexsil 300 on 100/120 mesh Chromosorb W (acid-washed)
ml/min: Carrier 20 H_2 50 Air 350
Inj. port: 300°C Detector: 400°C
Column Conditions: Programmed
Initial temp: 70°C, for two minutes
Final temp: 400°C, hold
Program rate: 6°/min Chart speed: 0.5 IPM
Detector: FID
Sensitivity: variable, usually 32×10^{-10}

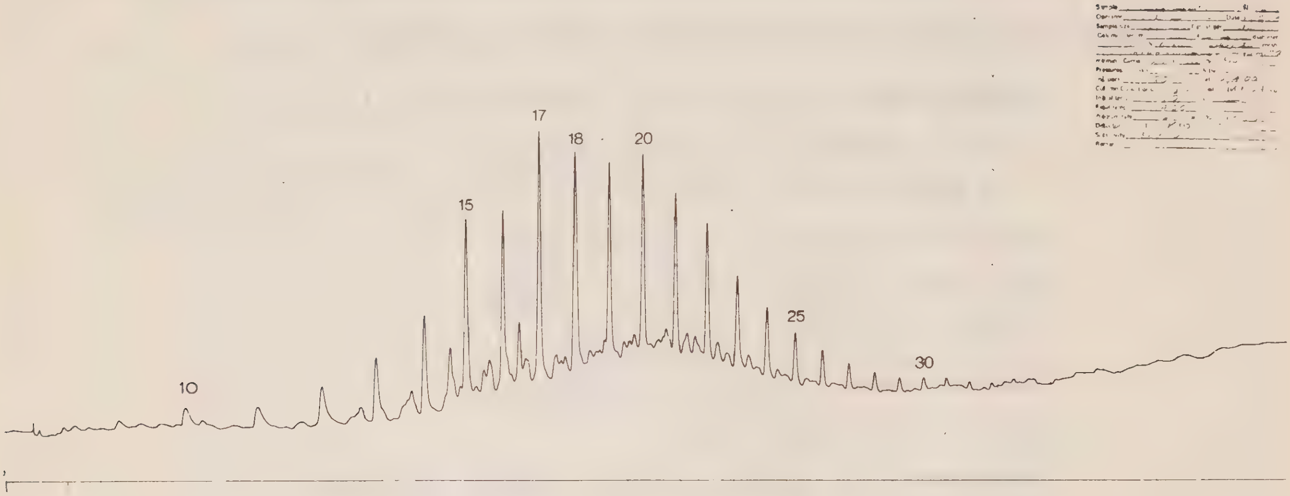
Chromatograms for isoprenoid/paraffin ratios

A Hewlett-Packard Model 5710A gas chromatograph was used. The parameters were as follows:

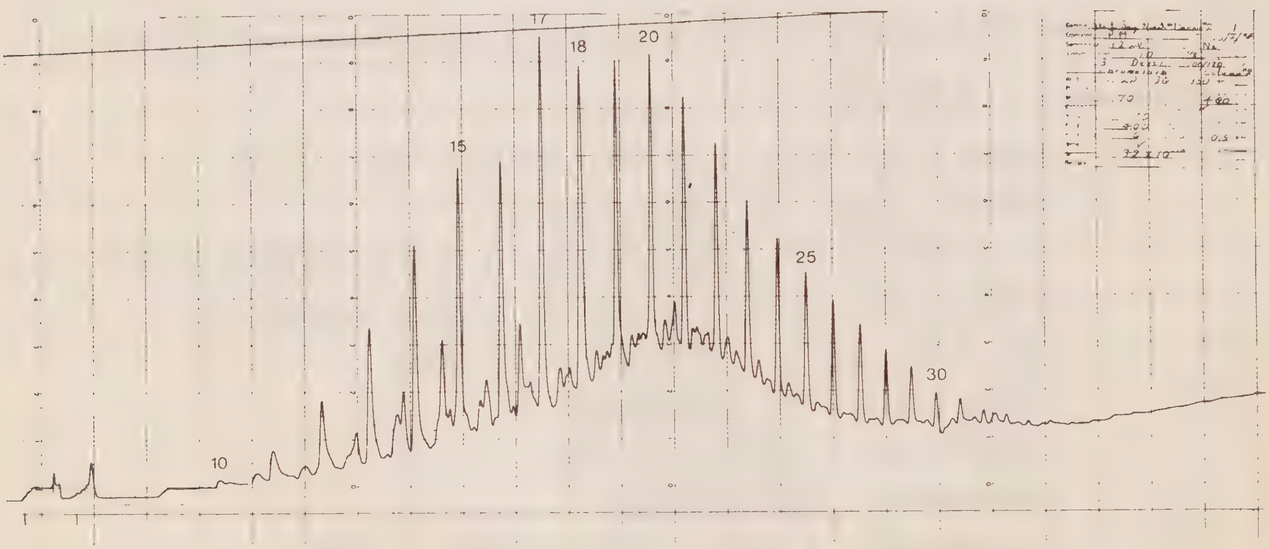
Sample size: 5 to 40 μl Carrier gas: He
Column: length 10' x 1/8" diameter
12.5% FFAP on 80/100 mesh Chromosorb G (acid-washed, DMCS treated)
ml/min: Carrier 30 H_2 34 Air 260 Make-up Carrier 26
Inj. port: 200°C Detector port: 300°C
Column conditions: programmed
Initial temp.: 100°C for 2 min.
Final temp.: 260°C for 4 min.
Program rate: 8°/min. Chart speed: 0.5 IPM
Detector: FID
Sensitivity: 8 x 100

CHROMATOGRAMS

Sample of oil spilled at Alert Bay
(taken directly from the fuel tanks of the Irish Stardust)



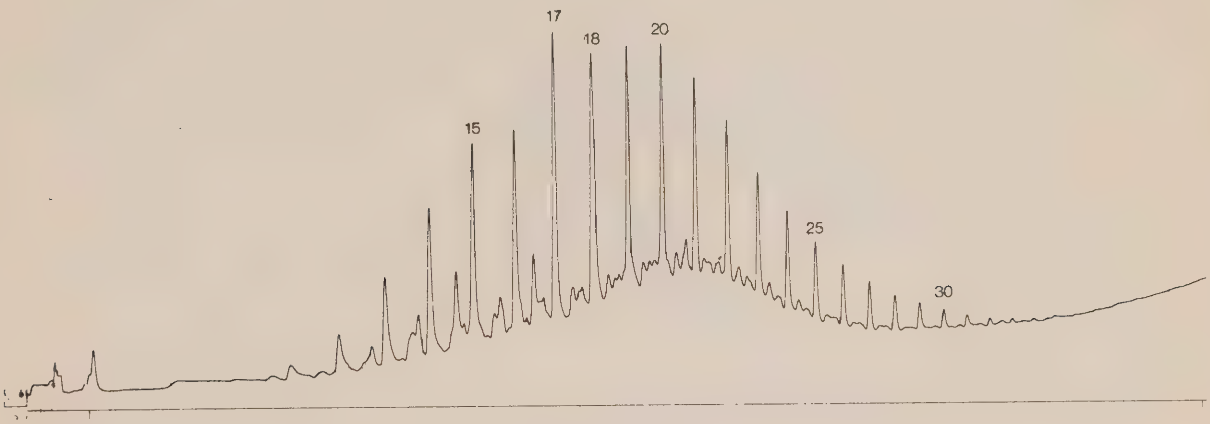
Reserved Bay, first visit, five days after the spill
(thick floating slick near the beach)



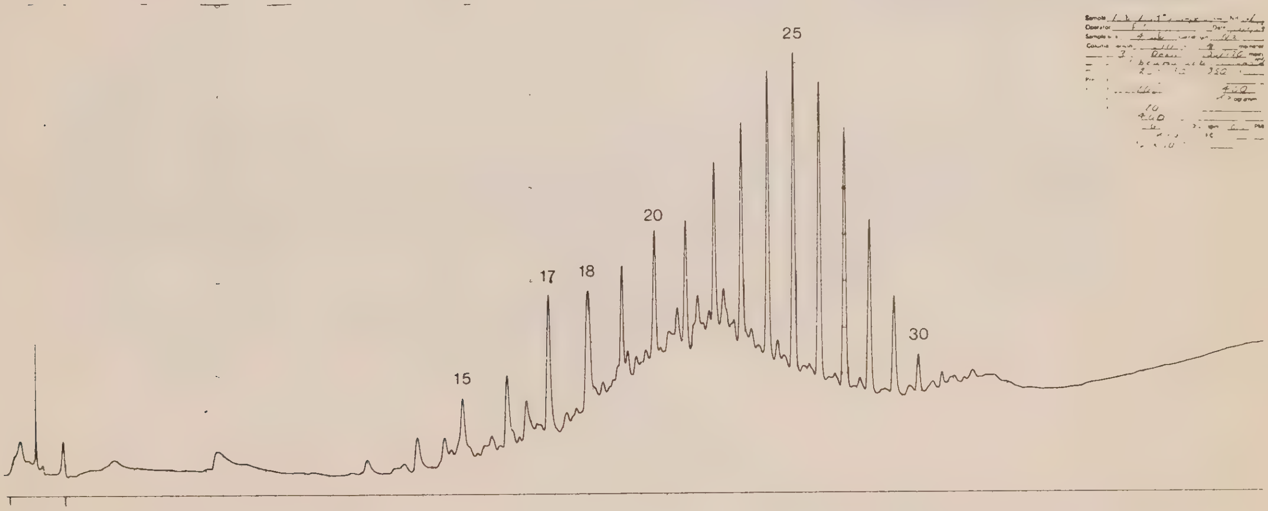
Comment: Note the very great similarity of the two chromatograms, with the relative heights of all peaks approximately the same. The only apparent weathering is a very small loss of C_9 and C_{10} compounds.

If the source of the polluting oil had been uncertain these chromatograms would have provided convincing evidence that the oil came from the Irish Stardust.

Second visit, six weeks after spill
(thick oil from between the rocks)

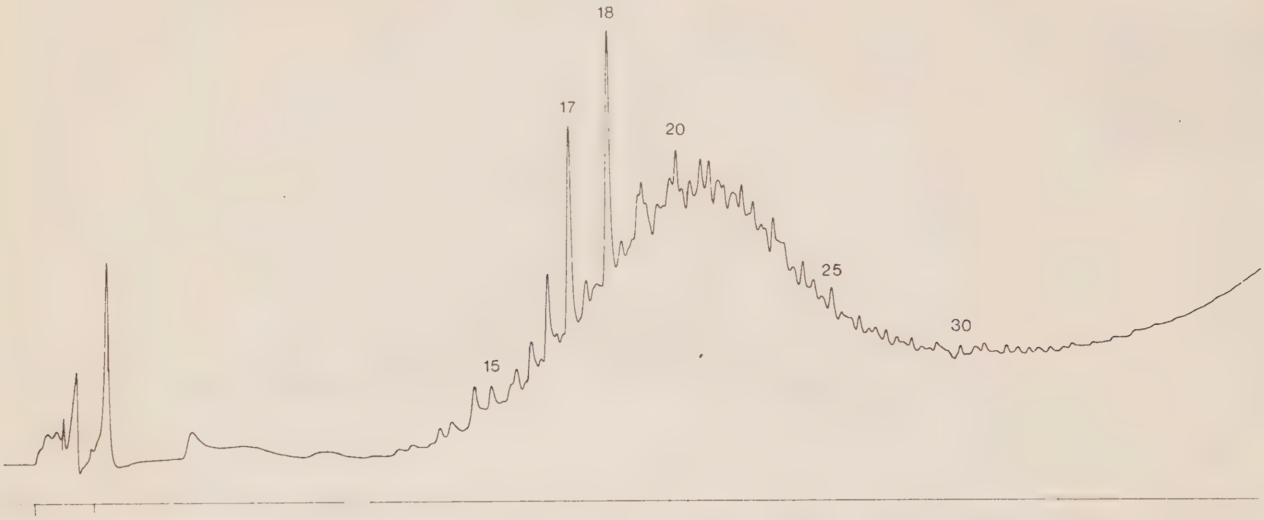


Third visit, four and a half months after spill
(oiled sand)

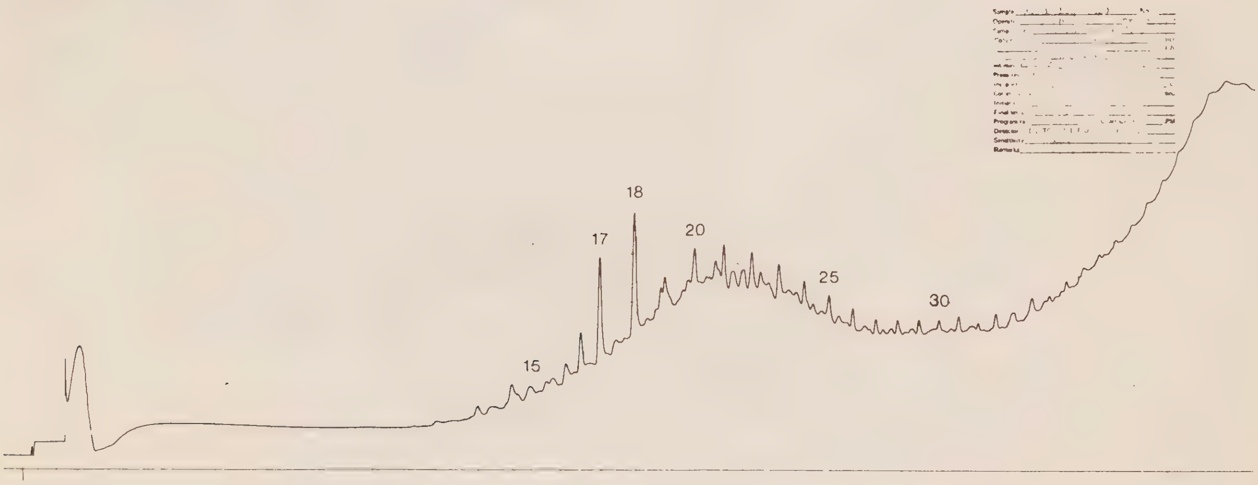


Comment: Very little change had occurred by the second visit, possibly because this sample was protected from some of the effects of weathering by being trapped between rocks. However, by the third visit a definite loss of compounds lighter than C_{25} had occurred relative to the heavier compounds.

Fourth visit, eight months after spill
(oiled surface gravel)



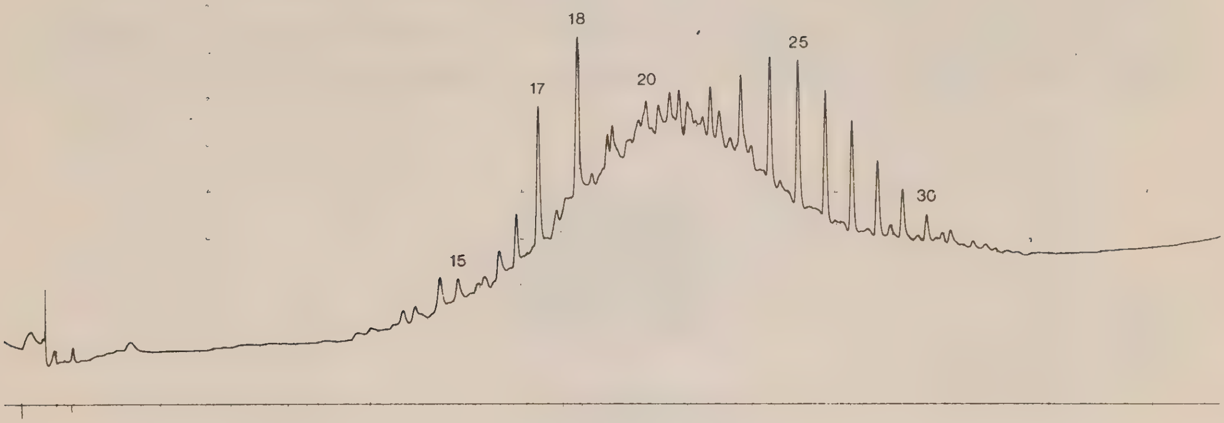
Fifth visit, one year after spill
(oiled surface gravel)



Comment: By the fourth visit all the paraffin compounds had been degraded. The peaks at 17 and 18 are the isoprenoids: pristane and phytane. These two compounds elute at the same time as the paraffins C_{17} and C_{18} respectively, but are not degraded as quickly by bacteria. The partial chromatograms in the next section separate the isoprenoid and paraffin peaks to show the relative amounts of each.

By the fifth visit, the 17 and 18 peaks appear to be diminishing, indicating the degradation of the isoprenoids.

Fifth visit
second sample of oiled gravel

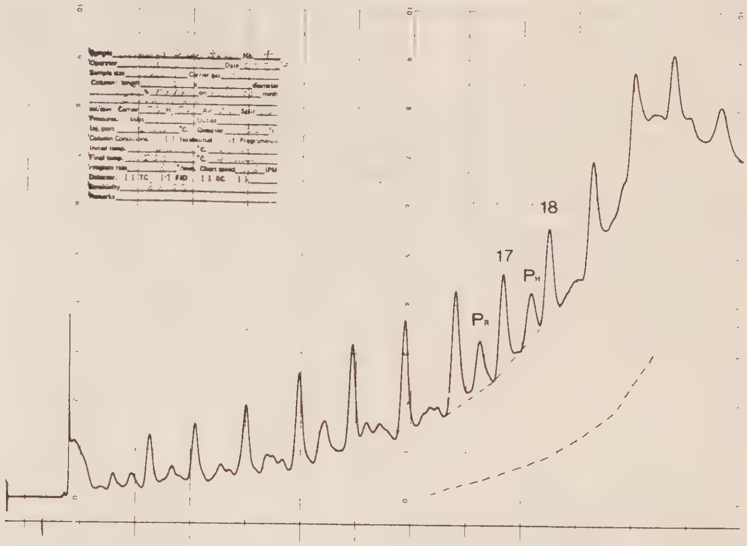


Comment: This sample was taken a few metres from the previous fifth visit sample. The chromatogram indicates that the oil in this sample is not as severely degraded as even the fourth visit sample, since the paraffins from C_{25} to C_{30} are obviously still present.

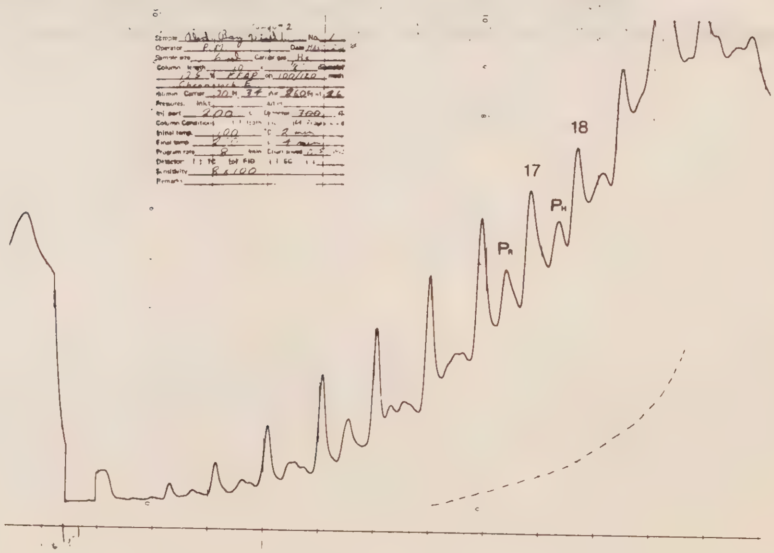
There is, then, a significant variation in the rate of degradation of the sample depending on its locale.

Isoprenoid/Paraffin Ratios

The ratio of paraffins to isoprenoids gives a numerical means of indicating the rate of degradation of oil. The following chromatograms separate the paraffins from the more slowly degraded isoprenoids, and the ratios are given in a table following the chromatograms. (The same samples have been used as for the previous chromatograms.)

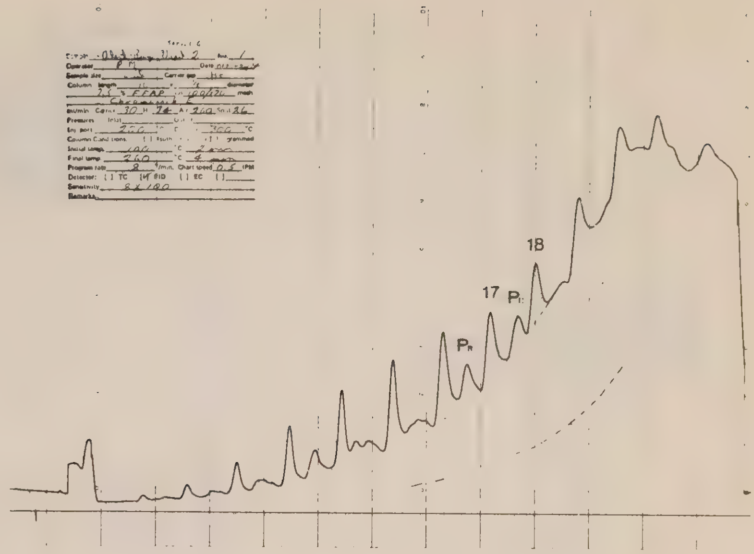


Original oil
from Irish Stardust

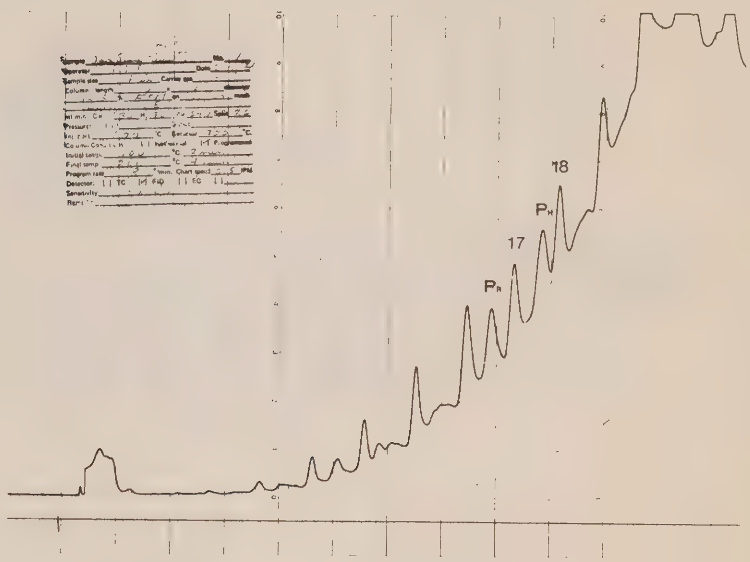


First visit
five days after spill
thick surface slick

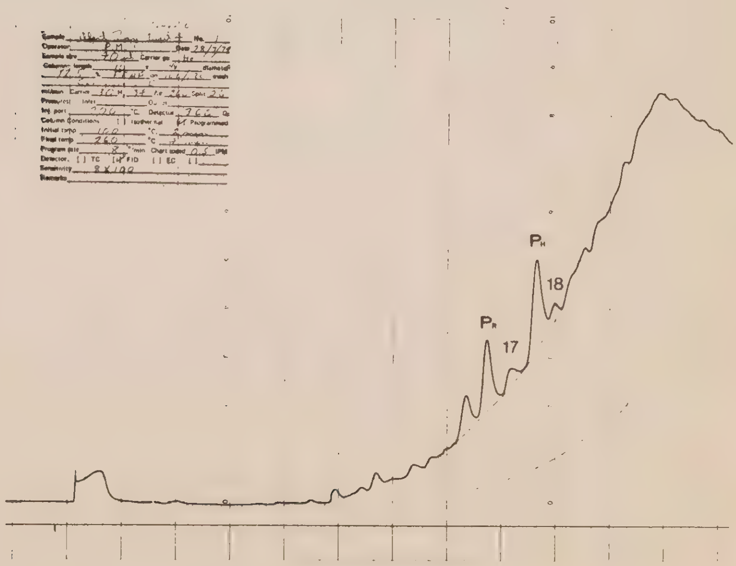
Second visit
6 weeks after spill
thick oil between rocks



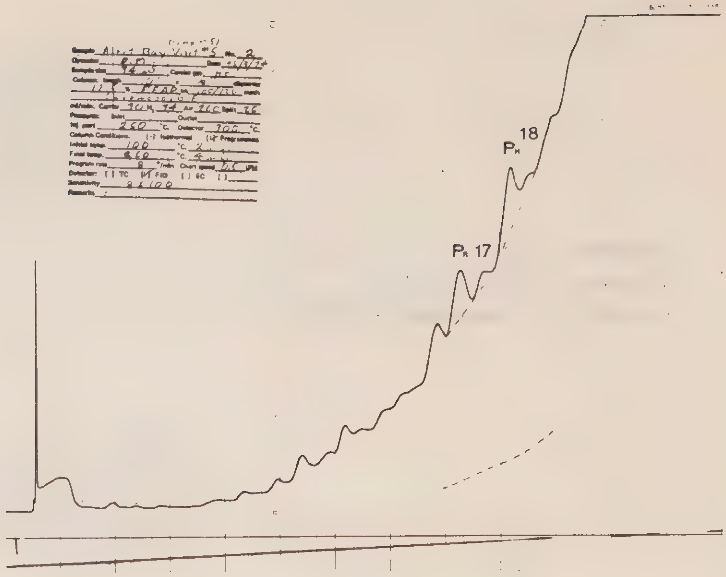
Third visit
4 1/2 months after spill
oiled sand



Fourth visit
8 months after spill
oiled gravel



Fifth visit
one year after spill
oiled gravel



Fifth visit
second sample of oiled
gravel

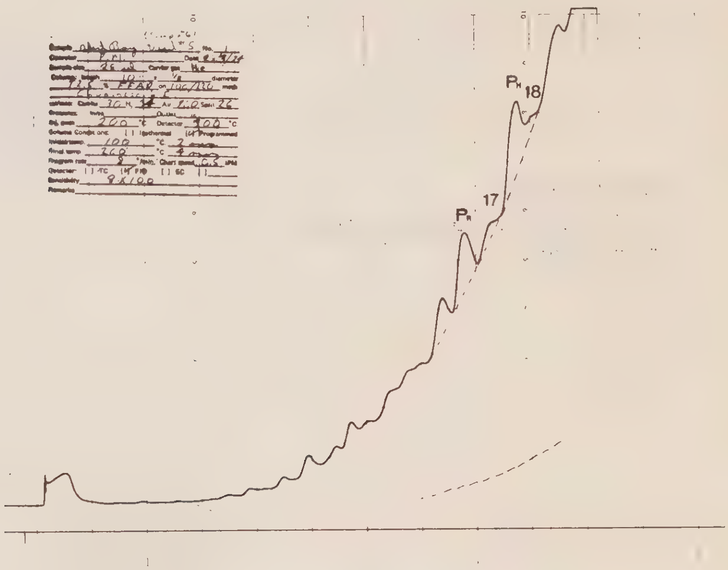


TABLE 6

Paraffin/Isoprenoid Ratios

Sample	C_{17}/Pr*	C_{18}/Ph*
Original fuel	1.9	2.2
Visit 1	1.9	2.2
Visit 2	1.7	1.8
Visit 3	1.2	1.2
Visit 4	.3	.2
Visit 5 sample 1	.3	.2
Visit 5 sample 2	.2	.3

*Uncertainty: 15% rising to 30% for final samples

Comment: The ratios clearly show the more rapid loss of the paraffins (heptadecane and octadecane) relative to the isoprenoids (pristane and phytane). This is characteristic of biological degradation of oil. Other natural degradative processes, such as photo-oxidation, normally oxidize the isoprenoids more quickly than the paraffins.

Discussion

It should be clearly understood that the chemical analysis of the spilt oil does not deal with the removal of the oil by physical processes. The action of wind, waves, and tide can physically carry away the oil without chemically altering it. We term this 'physical weathering'. Some physical weathering of the oil occurred at Reserved Bay, and this was described in the visual observations made during each visit.

'Chemical weathering' refers to the chemical alteration of the oil by the environment. It is this form of weathering that is revealed by the chromatograms.

Four processes are known to cause chemical weathering:

- dissolution
- evaporation
- abiological oxidation and polymerization(mostly photo-oxidation)
- biodegradation.

Dissolution and evaporation, the most rapid processes, affect only the lighter compounds since these are the most soluble and volatile. The heavy fuel oil spilt by the Irish Stardust included only a small portion of these lighter components and so dissolution/evaporation have only a minimal effect on the weathering of the oil. It is not surprising that there is very little change in the chemical composition of the oil over the first five days of exposure as shown by the first two chromatograms.

Photo-oxidation and biodegradation are slower-acting processes. The effects of each are not easily separated. However, the more rapid removal of the paraffins relative to the isoprenoids,(as shown by the second set of chromatograms) is characteristic of biodegradation, indicating that this is the dominant process.

The full chromatograms show the steady advance of biodegradation until, after approximately a year, the paraffins have been completely degraded. By comparison, in the laboratory where conditions are ideal, bacterial cultures can completely remove the paraffins from oil within 24 hours (Mechalas et al, 1973).

Bacterial degradation, then, appears to be the main mechanism for altering the chemistry of the oil on the beach. Under the conditions in the bay, and with the type of oil spilt, it takes on the order of one year for the bacteria to complete the degradation of the paraffins, leaving an asphalt-like residue on the stones of the beach.

CONCLUSIONS

The conclusions that can be drawn from this study have some general application in any oil spill situation, but their generality is limited by several factors.

First, this oil spill was small; the coating was not continuous along the coastline, did not cover the entire vertical range of the intertidal zone, and was not particularly thick (1-5mm). A more complete coverage of the intertidal zone could have more drastic biological effects, since recolonization from unpolluted areas would be much more difficult. A thicker covering may take exponentially longer to weather since it may immobilize the beach, paving it like a road, so preventing physical weathering and also bacterial degradation of the middle layers.

Secondly, the conclusions apply directly only to the type of oil spilt: heavy fuel oil. Oils with light components, for example diesel fuel, could be expected to disappear more quickly due to the effects of evaporation and dissolution but to have more severe biological effects. In the case of crude oil, the heavy fraction could be expected to behave like fuel oil, while the light fraction would, like diesel fuel, disappear rapidly and yet cause more biological damage.

Thirdly, the conclusions are relevant mainly to shorelines that are semi-exposed. Exposed locations would undergo more physical weathering and the oil covering could be expected to disappear more rapidly. Very protected areas would be slower to recover.

Biological Effects

Only those species that were in direct contact with oil seem to have been harmfully affected, particularly limpets and periwinkles, and perhaps isopods, rockweed and marsh grass.

No species has been completely eliminated, and there are indications that recolonization is occurring.

Within the limitations of the study, it appears that there will not be any permanent effects on the biological community at Reserved Bay.

Physical Weathering

The physical action of the wind, waves, and tide did not appear to have much effect on the oil-covering in this semi-exposed location. The pattern of contamination remained identical throughout the year-long study, with the exception of the oiled rockweed and sand, which were gradually removed.

Chemical Weathering:

The major mechanism for altering the chemistry of the oil in the bay was the action of bacteria. The bacteria took on the order of one year to degrade the paraffin portion of the oil, leaving a thin, unobtrusive, asphalt-like covering on the rock and gravel of the beach. This thin coating appeared to be more susceptible to physical weathering than the original oil, and was gradually disappearing.

In conclusion, the beach at Reserved Bay was still polluted by oil one year after the spillage occurred. However, approximately 90-95 percent of the volume of the oil had been removed by various natural processes, and the area was beginning to recover from the relatively small amount of biological damage that had occurred.

ACKNOWLEGEMENTS

We would particularly like to thank R. Schek and D. Parker, Fisheries Officers at Alert Bay, for their generous co-operation in providing transportation to Pearse Island and vicinity on each of our field trips to Reserved Bay.

Furthermore, we are indebted to P. Montgomery for his assistance in running the gas chromatographic analyses; to C. Hatfield of the Environmental Protection Service and A. Ages of the Marine Sciences Directorate for locating the study area; and to Dr. T. Parsons for his advice and help with administrative arrangements.

APPENDIX 1

SPECIFICATIONS OF FUEL OIL SPILT AT ALERT BAY:

Specific Gravity at 15°C	0.9412
A.P.I.	--
Vis. R.W. No. 1	465
Carbon	9.0%
Flash Point	91°C
Pour Point	-10°C
Sulfur	2.41%
Ash	Trace
Water	Trace

From fuelling report - Osaka, Japan

This fuel is termed '1000 second fuel oil'. It is a less viscous mix than Bunker C.

REFERENCES

Bawden, C.A., W.A. Heath and A.B. Norton, 1973: A preliminary baseline study of Roberts and Sturgeon banks. Westwater Research Centre, University of British Columbia, Technical Report No. 1.

Thomas, M.L.H. 1970: Zonation of shore biota in Bideford River, Prince Edward Island. Fish. Res. Board Can. Tech. Rep. 155:59p.

Mechalas, B.J., T.J. Meyers, and R.L. Kolpack, 1973: Microbial decomposition patterns using crude oil; The Microbial Degradation of Oil Pollutants. Centre for Wetland Resources, Louisiana State University, Baton Rouge, Louisiana, Publication No. LSU-SG-73-01.

Pacific Marine Sciences Report 74 – 10

OCEANOGRAPHIC OBSERVATIONS AT OCEAN STATION P (50° N, 145° W)

Volume 60

12 April – 7 August, 1974

C. de Jong, E.W. Marles

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MARINE SCIENCES DIRECTORATE, PACIFIC REGION

PACIFIC MARINE SCIENCE REPORT 74-10

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Victoria, B.C.
Marine Sciences Directorate, Pacific Region
Environment Canada
September, 1974

This is a manuscript which has received only limited circulation. On citing this report in a bibliography, the title should be followed by the words "UNPUBLISHED MANUSCRIPT" which is in accordance with accepted bibliographic custom.

INTRODUCTION

Canadian operation of Ocean Weather Station P (latitude 50°00'N, longitude 145°00'W) was inaugurated in December, 1950. The station is occupied primarily to make meteorological observations of the surface and upper air and to provide an air-sea rescue service. The station is manned by two vessels operated by the Marine Services Branch of the Ministry of Transport. They are the CCGS Vancouver and the CCGS Quadra. Each ship remains on station for a period of six weeks, and is then relieved by the alternate ship, thus maintaining a continuous watch. During part of 1974, the CSS Parizeau of the Department of the Environment replaced the CCGS Quadra, while Quadra was on operation "GATE".

Bathythermograph observations have been made at Station P since July, 1952. A program of more extensive oceanographic observations commenced in August, 1956. This was extended in April, 1959, by the addition of a series of oceanographic stations along the route to and from Station P and Swiftsure Bank. These stations are known as Line P stations. The number of stations on Line P has been increased twice and now consists of twelve stations (Fig. 1). Bathythermograph observations and surface salinity sample collections, in addition to being made on Line P oceanographic stations, are also made at odd meridians at 40', i.e. 139°40'W, 141°40'W, etc. These stations are known as Line P BT stations. Data observed prior to 1968 has been indexed by Collins *et al*, (1969).

The present record includes surface temperature and salinity data collected from the Parizeau during the period 12 April to 15 May 1974; hydrographic and continuously sampled STD data collected from the Vancouver during the period 10 May to 26 June 1974 and hydrographic data collected from the Parizeau during the period 21 June to 7 August 1974.

All physical oceanographic data have been stored by the Canadian Oceanographic Data Centre (CODC), 615 Booth Street, Ottawa, Ontario, Canada. Requests for these data should be directed to CODC.

Biological and productivity data are published in the Manuscript Report series of the Fisheries Research Board of Canada (FRB), the Biological Station, Nanaimo, B.C., Canada. Requests for these data should be directed to FRB.

Marine geochemical data are for the Ocean Chemistry Group, Marine Sciences Directorate, Department of the Environment, 512 - 1230 Government St., Victoria, B.C., Canada.

Program of Observations from CSS Parizeau, 12 Apr.-15 May, 1974 (P-74-4) (CODC Ref. No. 15-74-004)

Oceanographic observations were made by the ship's officers.

En route to and from Station P, BT's were taken at all Line P and BT stations. A salinity sample was taken from the seawater loop at that time. The thermosalinograph recorder was run continuously.

At Station P the oceanographic program was carried out as follows:

I. Physical Oceanography

1) BT's were taken every 3 hours to coincide with meteorological observations.

2) Salinity samples daily at 0000 hrs GMT from the seawater loop.

II. Marine Geochemistry

Samples were obtained as follows:

1) Nutrient samples daily at 0000 hrs GMT from the seawater loop.

2) Alkalinity samples once every three days from the seawater loop.

3) Air CO_2 samples weekly in quadruplicate.

Program of Observations from CCGS Vancouver, 10 May-26 June, 1974 (P-74-5) (CODC Ref. No. 15-74-005)

Oceanographic observations were made by Mr. C. de Jong, Marine Sciences Directorate, Department of the Environment.

En route to Station P, Line P stations 1-9 were occupied and an STD profile made to near bottom or 1500 metres. A salinity, nitrate, nutrient, alkalinity and total CO_2 sample was taken at that time from the seawater loop. BT or XBT's were taken at these stations and BT stations. After station 9 all remaining stations were cancelled due to rough seas. No surface samples could be taken due to air in the seawater loop system. The thermosalinograph was shut down for the same reason. The surface temperature recorder was run continuously.

At Station P the oceanographic program was carried out as follows:

I. Physical Oceanography

1) Profiles of salinity, temperature and oxygen were obtained weekly from 6 hydrographic stations.

2) STD profiles to 1500 metres following the hydrographic stations.

3) STD profiles to 300 metres between the hydrographic stations.

4) BT's were taken every three hours to coincide with meteorological observations, encoded and transmitted according to the IGOSS format.

5) Salinity samples daily at 0000 hrs GMT from the seawater loop.

II. Marine Geochemistry

1) Samples for alkalinity, total CO_2 and salinity were obtained from 6 depths to 500 metres and every three days from the seawater loop.

2) Samples for nutrients, phosphate and salinity were obtained from 6 depths to 500 metres and daily at 0000 hrs GMT from the seawater loop. Nutrient and phosphate samples were also collected once every hour for a 24 hour period.

3) Air CO_2 samples weekly in quadruplicate.

4) Two seawater C_{-14} samples extracted from the seawater loop.

5) Seven surface tarball tows were made at a speed of 4 knots. The duration of each tow was approximately 15 minutes.

III. Biological and Productivity

Samples were obtained as follows:

1) 19 - 150 metre vertical plankton hauls.
   1 - 1200 metre vertical plankton haul.
   6 - Surface plankton tows for 10 minutes at sundown.
   64 - Micro and nano organism samples filtered from the seawater loop.

2) Samples for plant pigment, nitrate and C_{14} productivity were obtained from 3 stations to 200 metres.

3) Approximately 300 salmon were caught.

IV. Observations for Other Agencies

1) Marine mammal observations were made by the ship's officers for Mr. I. McAskie, Fisheries Research Board of Canada, the Biological Station, Nanaimo, B.C., Canada.

2) Bird observations were made by the ship's officers for Dr. M. Myres, University of Alberta, Calgary, Alberta, Canada.

En route from Station P, Stations 12 and 11 were occupied and an STD profile made to 1500 metres. During the end of Station 11, the depth sensor of the STD failed to function. Stations 10-5 were continued with a model 8101 Guildline STD to 300 metres. Salinity, nitrate, nutrient, alkalinity and total CO_2 samples were taken at that time from the seawater loop. Stations 4-1 were cancelled due to high winds. No surface samples could be taken due to air in the seawater loop system. The thermosalinograph was shut down for the same reason. BT's were taken at Stations 12-5, XBT's at Stations 4-1 and all BT stations. The surface temperature recorder was run continuously.

Program of Observations from CSS Parizeau, 21 June - 7 Aug., 1974 (P-74-6) (CODC Ref. No. 15-74-006)

Oceanographic observations were made by Mr. E.W. Marles, Marine Sciences Directorate, Department of the Environment.

En route to Station P, Line P stations 1-6 were occupied and an STD profile made to near bottom or 1500 metres. After Station 6 the salinity sensor of the STD failed to function, causing the cancellation of Stations 7-12. Salinity, nitrate, nutrient and alkalinity samples were taken at all Line P stations. A BT or XBT was taken at all Line P and BT stations. Five surface tarball tows were made at a speed of 4½ knots. The duration of each tow was approximately 15 minutes. The thermosalinograph was run continuously.

At Station P the oceanographic program was carried out as follows:

I. Physical Oceanography

1) Profiles of salinity, temperature and oxygen were obtained from 8 hydrographic stations (2 to 4000 metres, 4 to 2000 metres and 2 to 600 metres). Profiles of salinity and temperature were obtained from 3 hydrographic stations (1 to 2000 metres and 2 to 600 metres).

2) BT's were taken every three hours to coincide with meteorological observations, encoded and transmitted according to the IGOSS format.

3) Salinity samples daily at 0000 GMT from the seawater loop.

II. Marine Geochemistry

1) Samples for nutrients, phosphate and tritium were obtained from 6 depths to 500 metres. Nutrient, phosphate and salinity samples were also collected daily at 0000 hrs GMT and once every hour for a 24 hour period from the seawater loop.

2) Alkalinity samples every 3 days from the seawater loop.

3) Air CO_2 samples weekly in quadruplicate.

4) Two seawater C-14 samples extracted from the seawater loop.

5) Six surface tarball tows were made at a speed of 4 knots. The duration of each tow was approximately 15 minutes.

III. Biological and Productivity

Samples were obtained as follows:

1) 36 - 150 metre vertical plankton hauls.
   2 - 1200 metre vertical plankton hauls.
   9 - Surface plankton tows for 10 minutes at sundown.
   25 - Nano organism samples filtered from the seawater loop.

2) Samples for plant pigment, nitrate and C_{14} productivity were obtained from 3 stations to 200 metres.

3) Approximately 250 salmon, 300 pomfret, 4 jack mackeral and 1 ribbon barracudina were caught. Pomfret appeared on 14 July.

IV. Observations for Other Agencies

1) Marine mammal observations were made by the ship's officers for Mr. I. McAskie, Fisheries Research Board of Canada, the Biological Station, Nanaimo, B.C., Canada.

2) Bird observations were made by the ship's officers for Dr. M. Myres, University of Alberta, Calgary, Alberta, Canada.

3) The 16 foot diameter disc buoy anchored at Station Papa by the University of California on 11 November 1972 was removed from station.

En route from Station P only Stations 12, 10, 8 and 6 were occupied and a hydrographic cast made for temperature and salinity to 600 metres. Salinity, nitrate, nutrient and alkalinity samples were taken at all Line P stations from the seawater loop. BT's or XBT's were taken at all Line P and BT stations. The thermosalinograph was run continuously.

Data was processed, assembled and edited for publication by Messrs. C. de Jong, B. Minkley, E. Luscombe and E. Marles.

OBSERVATIONAL PROCEDURES

Temperatures at depth were measured by deep-sea-reversing thermometers of German (Richter and Wiese) or Japanese (Yoshino Keiki Co.) manufacture. Two protected thermometers were used on all Nansen bottles, and one unprotected thermometer was used on each bottle at depths of 300 m or greater. The accuracy of protected reversing thermometers is believed to be ± 0.02°C.

Surface water temperatures were measured from a bucket sample using a deck thermometer of ± 0.1°C accuracy.

Salinity determinations were made aboard ship with either an Auto-Lab Model 601 Mark 111 inductive salinometer or a Hytech Model 6220 lab salinometer. Accuracy using duplicate determinations is estimated to be ± 0.003 ppt.

Depth determinations were made using the "depth difference" method described in the U.S.N. Hydrographic Office Publication No. 607 (1955). Depth estimates have an approximate accuracy of ± 5 m for depths less than 1000 m, and ± 0.5% of depth for depths greater than 1000 m.

The dissolved oxygen analyses were done in the shipboard laboratory by a modified Winkler method (Carpenter, 1965).

Line P engine intake continuous temperatures on both ships were recorded by a Honeywell Model 15303836 Recorder. The temperature probe is at a depth of approximately 3 metres below the sea surface and the instrument accuracy is believed to be ± 0.1°C.

Each ship is equipped with a Bissett Berman Model 6600-T thermosalinograph which is used, on Line P, for continuous recording of surface temperatures and salinities from the

ship's seawater loop. The temperature probe is mounted at the seawater loop intake (approximately 3 metres below the surface) and the salinity probe and recorder is situated in the dry lab. The accuracy of this instrument is believed to be ± 0.1°C for temperature and ± 0.1 ppt for salinity.

Each ship is equipped with a Bissett-Berman Model 9006 STD.

COMPUTATIONS

All hydrographic data were processed with the aid of an IBM 360 computer. Reversing thermometer temperature corrections, thermometric depth calculations, and accepted depth from the "depth difference" method were computed. Extraneous thermometric depths caused by thermometer malfunctions are automatically edited and replaced. A Calcomp 565 Offline Plotter was used to plot temperature-salinity and temperature-oxygen diagrams, as well as plots of temperature, salinity, and dissolved oxygen vs $\log_{10}$ depth. These plots were used to check the data for errors.

Missing hydrographic data were obtained using a weighted parabolas interpolation method (Reiniger and Ross, 1968). These data are indicated with an asterisk in this data record.

Data values which we suspect but which we have included in this data record are indicated with a plus. These data have been removed from punch card and magnetic tape records.

Analog records from the salinity-temperature-pressure instrument have been machine digitized, then replotted using the Calcomp Plotter.

Digitization was continued until original and computer plotted traces were coincident. Temperature and salinity values were listed at standard pressures; integrals (depths, geopotential anomaly, and potential energy anomaly) were computed from the entire array of digitized data.

The headings for the data listings are explained as follows:

PRESS	is pressure (decibars)
TEMP	is temperature (degrees Celsius)
SAL	is salinity (parts per thousand)
DEPTH	is reported in metres
SIGMA-T	is specific gravity anomaly
SVA	is specific volume anomaly
THETA	is potential temperature (degrees Celsius)
SVA (THETA)	is potential specific volume anomaly
DELTA D	is geopotential anomaly (J/kg)
POT EN	is potential energy in units of 10^8 ergs/cm^2
OXY	is the concentration of dissolved oxygen expressed in millilitres per litre
B-V PERIOD	is the Brunt-Vaisala period in minutes

REFERENCES

Carpenter, J.H. 1965. The Chesapeake Bay Institute technique for the Winkler dissolved oxygen method. Limnol. and Oceanogr., 10: 141-143.

Collins, C.A., R.L. Tripe, D.A. Healey, and J. Joergensen. 1969. The time distribution of serial oceanographic data from the ocean Station P programme. Fish. Res. Bd. Can. Tech. Rept. no. 106.

Reiniger, R.F., and C.K. Ross. 1968. A method of interpolation with application to oceanographic data. Deep Sea Res., 15: 185-193.

U.S.N. Hydrographic Office. 1955. Instruction manual for oceanographic observations, Publ. no. 607.

LIST OF FIGURES

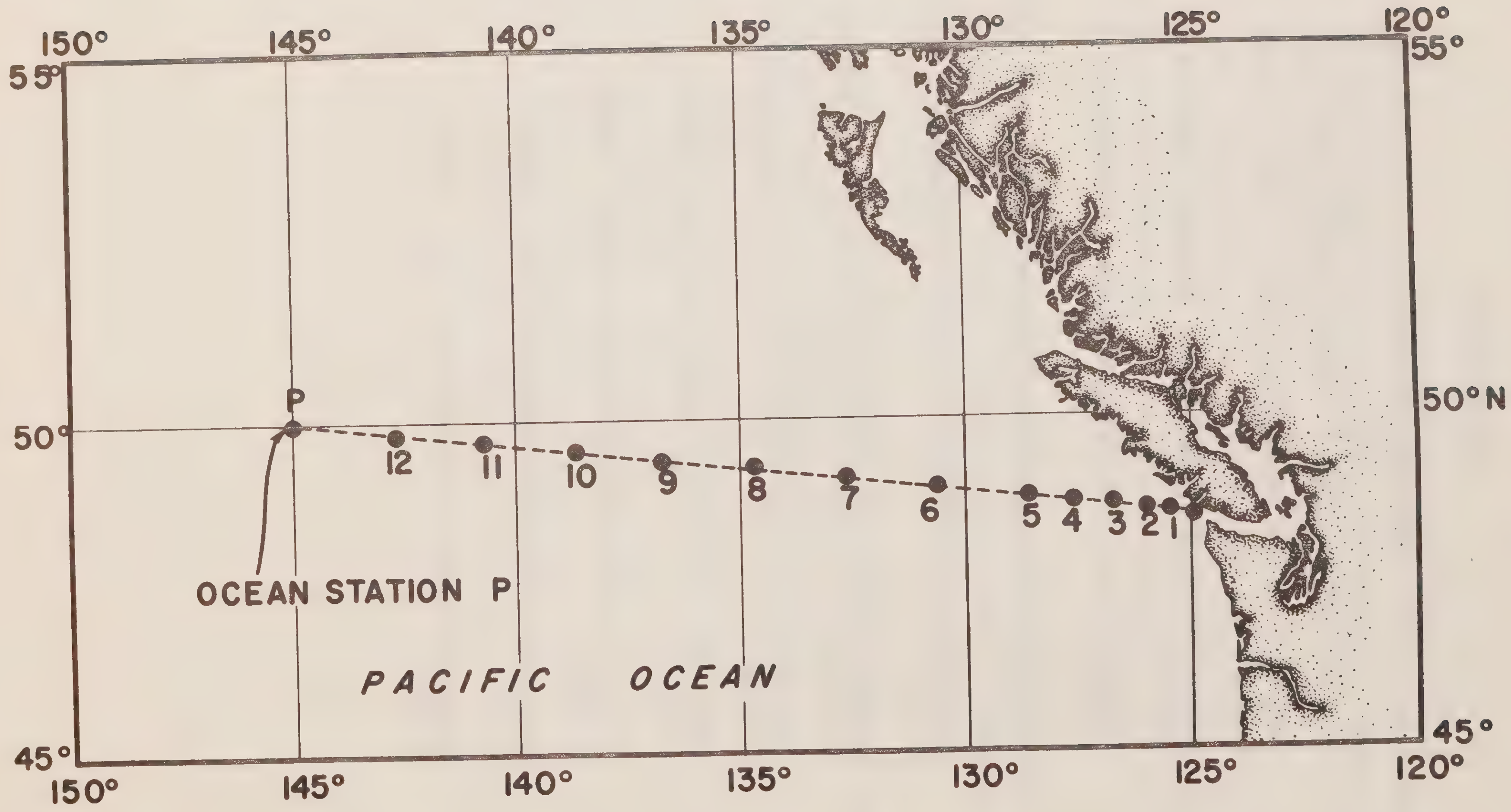


Fig. 1 Chart showing Line P station positions.

OCEANOGRAPHIC DATA OBTAINED ON CRUISE P-74-4

(CODC REFERENCE NO. 15-74-004)

SURFACE TEMPERATURE AND SALINITY OBSERVATIONS

(P-74-4)

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
CRUISE REFERENCE NUMBER 74- 4

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
74	4	13	30	28.864	9.4	125-30
74	4	13	230	29.339	8.9	126- 0
74	4	13	420	32.297	8.4	126-40
74	4	13	740	32.413	8.3	127-40
74	4	13	1100	32.445	7.8	128-40
74	4	13	1720	32.564	6.9	130-37
74	4	13	2315	32.641	7.2	132-40
74	4	14	520	32.507	6.3	134-40
74	4	14	1135	32.558	6.4	136-41
74	4	14	1740	32.611	6.2	138-40
74	4	15	0	32.634	5.5	140-40
74	4	15	1800		5.8	143-20
74	4	16	0	32.654	6.1	ON STATION
74	4	17	0	32.700	5.6	ON STATION
74	4	18	0	32.679	5.4	ON STATION
74	4	19	0	32.679	5.5	ON STATION
74	4	20	0	32.661	5.3	ON STATION
74	4	21	0	32.693	5.1	ON STATION
74	4	22	0	32.693	5.2	ON STATION
74	4	23	0	32.716	5.3	ON STATION
74	4	24	0	32.709	5.4	ON STATION
74	4	25	0	32.707	5.4	ON STATION
74	4	26	0	32.692	5.4	ON STATION
74	4	27	0	32.698	5.8	ON STATION
74	4	28	0	32.721	5.6	ON STATION
74	4	29	0	32.705	5.5	ON STATION
74	4	30	0	32.687	5.6	ON STATION
74	5	1	0	32.709	5.4	ON STATION
74	5	2	0	32.686	5.5	ON STATION
74	5	3	0	32.670	5.5	ON STATION
74	5	4	0	32.669	5.8	ON STATION
74	5	5	0	32.693	5.7	ON STATION
74	5	6	0	32.635	5.8	ON STATION
74	5	7	0	32.690	5.8	ON STATION
74	5	8	0	32.651	6.2	ON STATION
74	5	9	0	32.636	6.0	ON STATION
74	5	10	0	32.657	6.0	ON STATION
74	5	11	0	32.643	6.2	ON STATION
74	5	12	0	32.683	5.9	ON STATION
74	5	13	0	32.603	6.2	ON STATION
74	5	13	500	32.638	6.2	143- 5
74	5	13	1300	32.609	6.5	140-40
74	5	13	1630	32.616	6.7	139-40
74	5	13	2000	32.596	7.0	138-40
74	5	13	2245	32.563	6.6	137-40

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
CRUISE REFERENCE NUMBER 74- 4

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
74	5	13	2245	32.563	6.6	137-40
74	5	14	140	32.555	7.7	136-37
74	5	14	500	32.548	7.7	135-40
74	5	14	750	32.480	7.7	134-21
74	5	14	1240	32.491	7.8	132-43
74	5	14	1545	32.492	7.9	131-40
74	5	14	1840	32.541	8.4	130-40
74	5	14	2130	32.545	8.6	129-40
74	5	15	40	32.265	9.5	128-40
74	5	15	400	32.047	10.3	127-40
74	5	15	710	32.039	9.8	126-40
74	5	15	1000	30.478	10.2	126- 0
74	5	15	1130	30.815	9.7	125-32

BATHYTHERMOGRAPH OBSERVATIONS

(P-74-4)

BATHYTHERMOGRAPH OBSERVATIONS

This section includes all B.T.'s taken on Line P outbound and inbound, and one a day on station P .

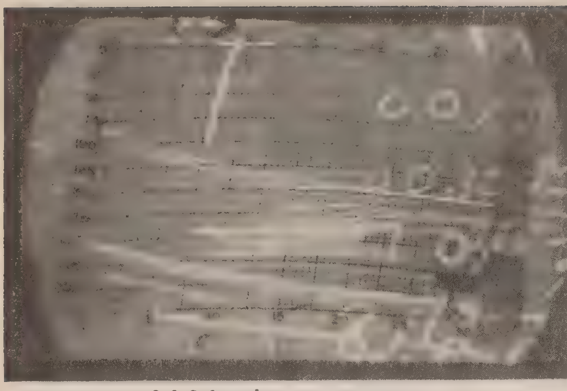
Although B.T.'s at station P were taken every 3 hours, only the one taken at 1800 GMT has been shown.

Weather conditions on Line P sometimes forces the cancellation of a B.T., in that case an X.B.T. was taken. These X.B.T.'s are shown following the B.T.'s.

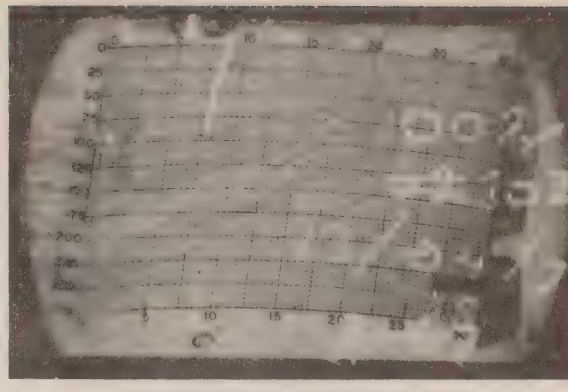
EXPLANATION OF HEADINGS

Example: 0030/ 13-04-74
48° 34' N.
125° 30' W.

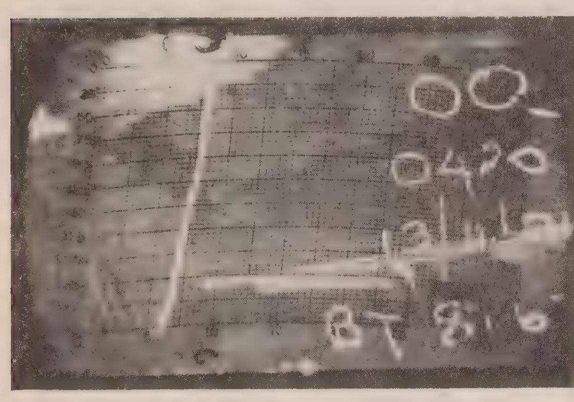
0030 = Time in GMT
13 = Day
04 = Month
74 = Year
48° 34' N. = Latitude
125° 30' W. = Longitude



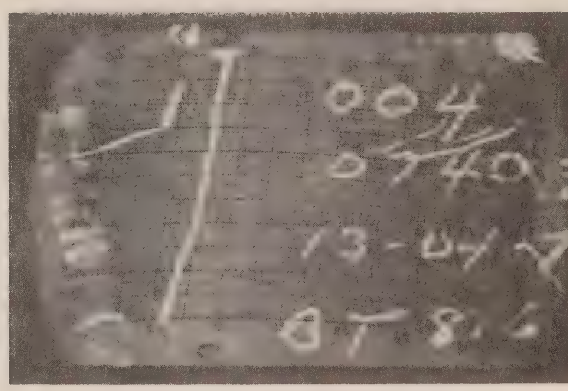
0030 / 13-04-74
48° 34 N.
125° 30' W.



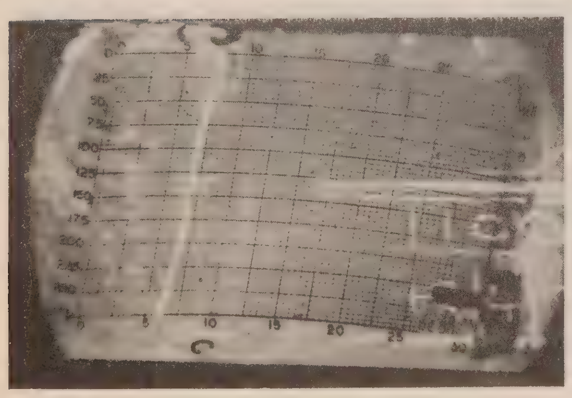
0230 / 13-04-74
48° 36' N.
126° 00' W.



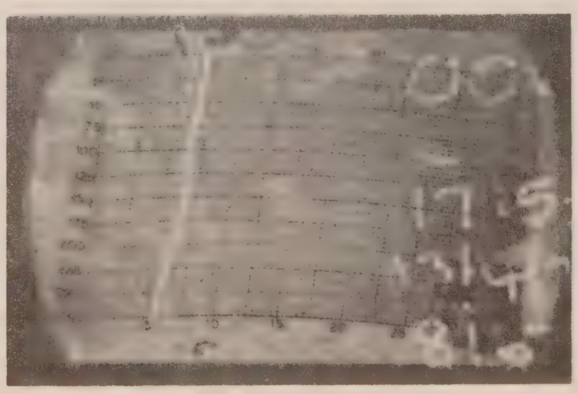
0420 / 13-04-74
48° 39' N.
126° 40' W.



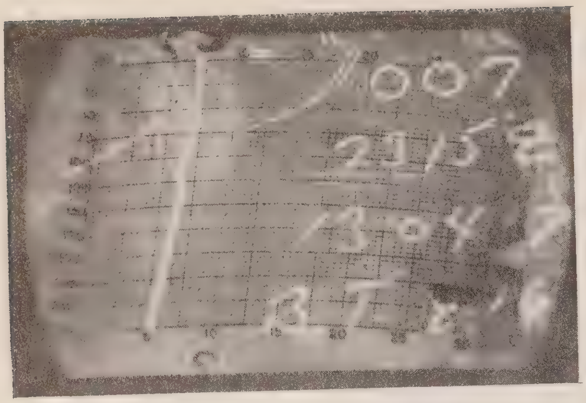
0740 / 13-04-74
48° 43' N.
127° 40' W.



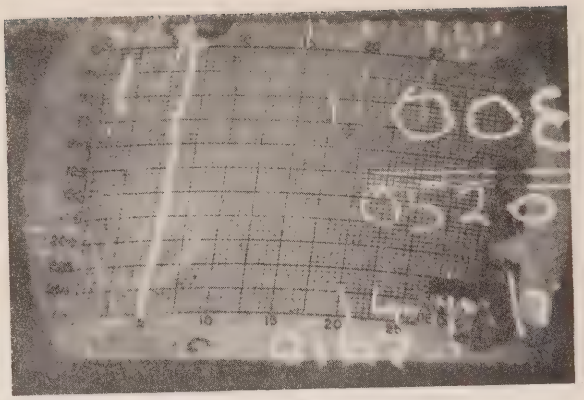
1100 / 13-04-74
48° 48' N.
128° 40' W.



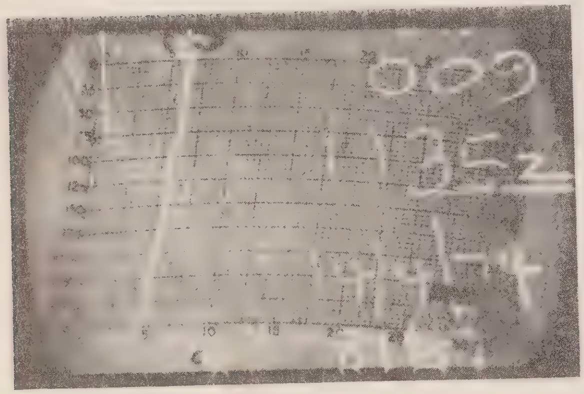
1720 / 13-04-74
48° 57' N.
130° 37' W.



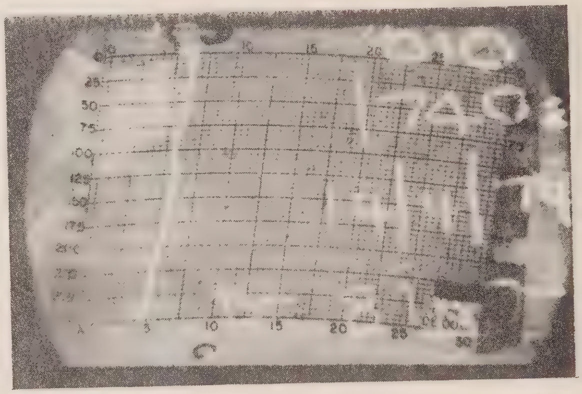
2315 / 13-04-74
49° 06' N.
132° 40' W.



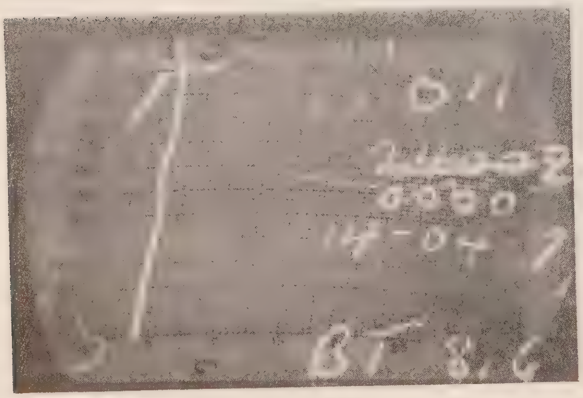
0520 / 14-04-74
49° 14' N.
134° 40' W.



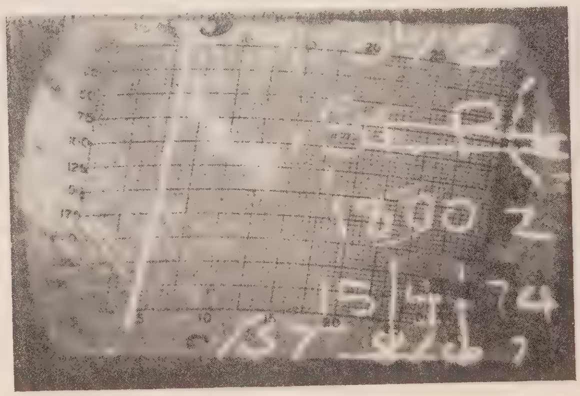
1135 / 14-04-74
49° 21' N.
136° 41' W.



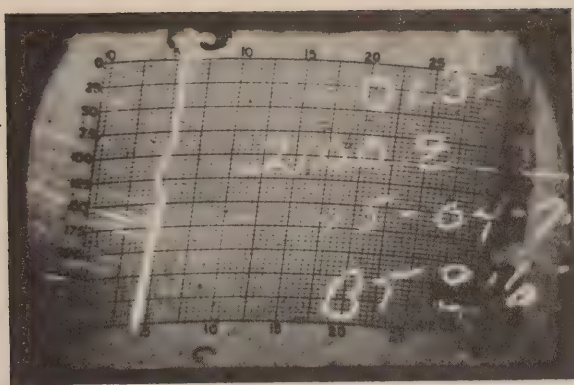
1740 / 14-04-74
49° 31' N.
138° 40' W.



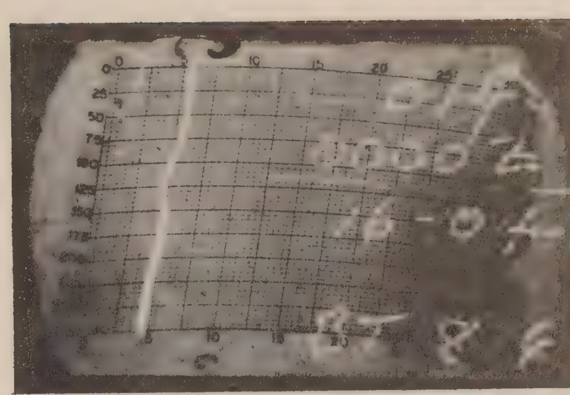
0000 / 15-04-74
49° 40' N.
140° 40' W.



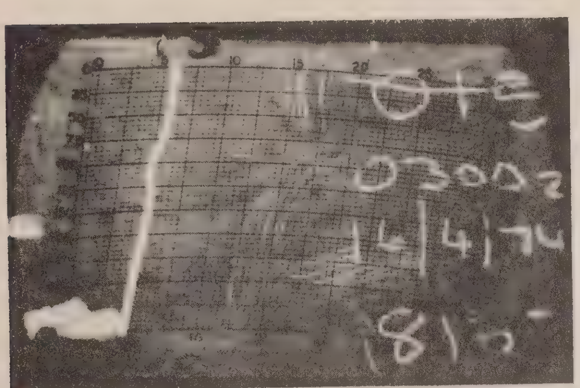
1800 / 15-04-74
49° 39' N.
143° 20' W.



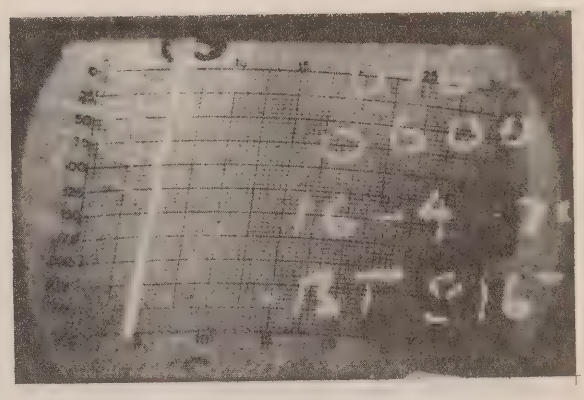
2100 / 15-04-74
49° 38' N.
143° 36' W.



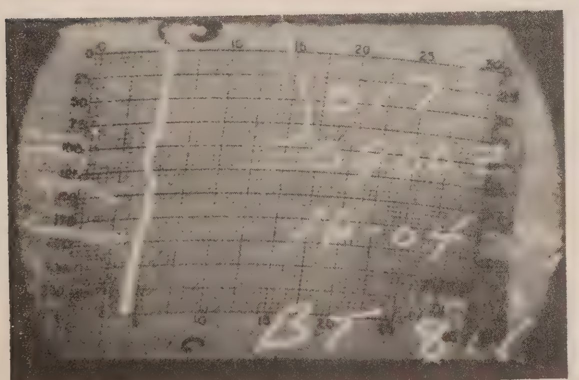
0000 / 16-04-74
49° 38' N.
143° 53' W.



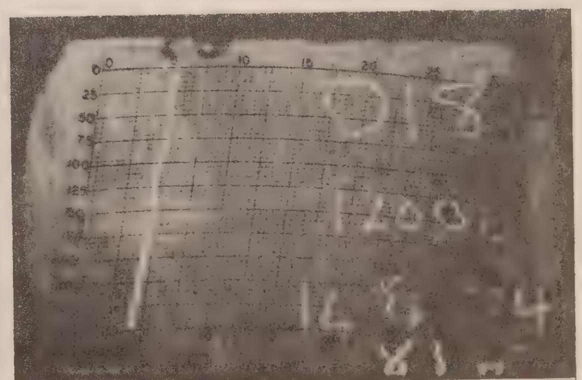
0300 / 16-04-74
49° 37' N.
144° 11' W.



0600 / 16-04-74
49° 38' N.
144° 19' W.

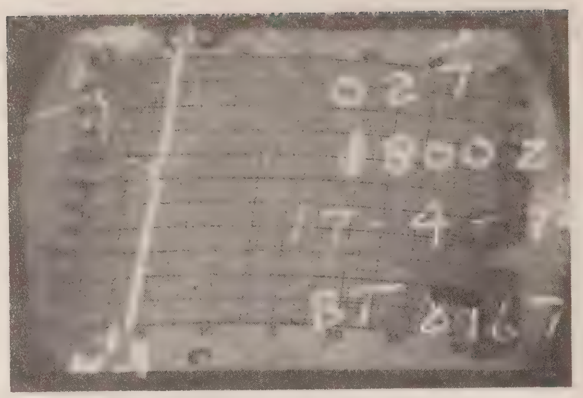


0900 / 16-04-74
49° 40' N.
144° 38' W.

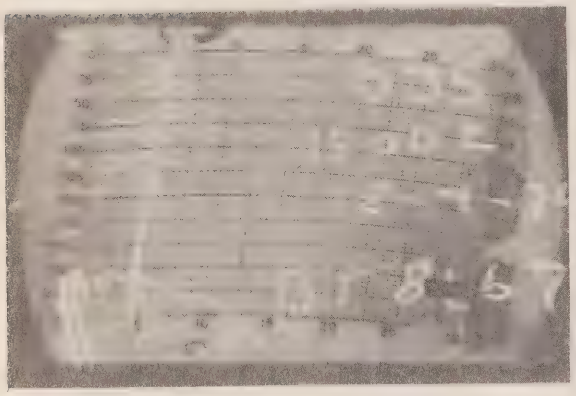


1200 / 16-04-74
49° 40' N.
144° 52' W.

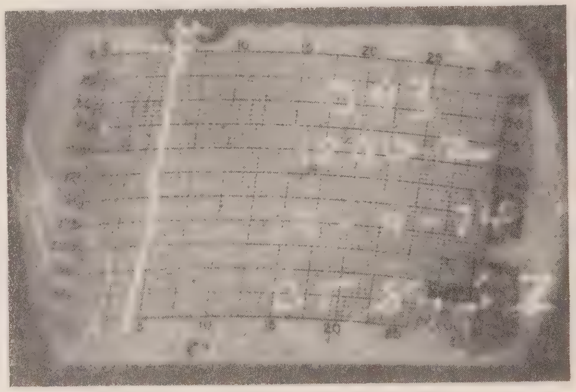
1800 / 16-04-74
49° 43' N.
145° 19' W.



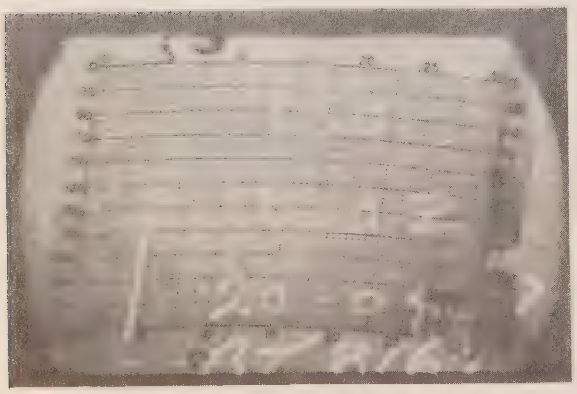
1800 / 17-04-74
49° 59' N.
144° 48' W.



1800 / 18-04-74
50° 02' N.
144° 57' W.



1800 / 19-04-74
50° 07' N.
144° 33' W.



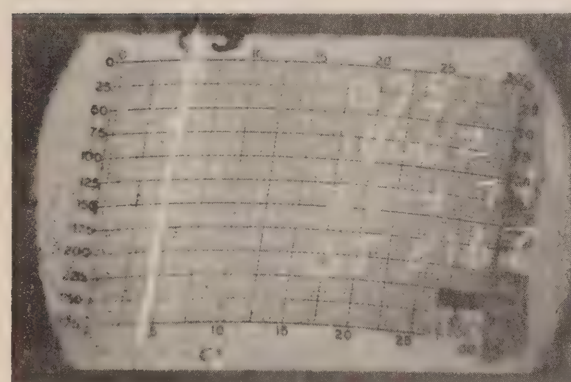
2100 / 20-04-74
50° 00' N.
144° 49' W.

1800 / 22-04-74
50° 00' N.
145° 05' W.

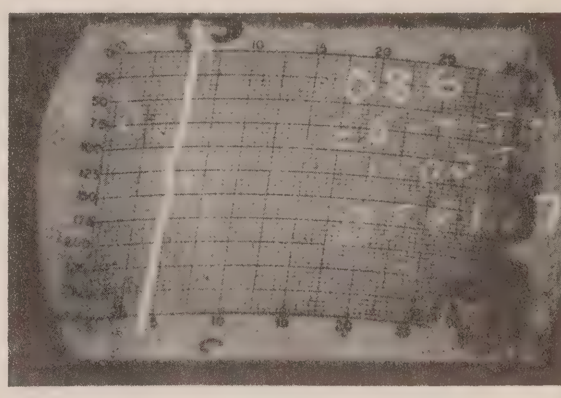
1800 / 23-04-74
49° 58' N.
145° 39' W.

PICTURE NOT
REPRODUCIBLE

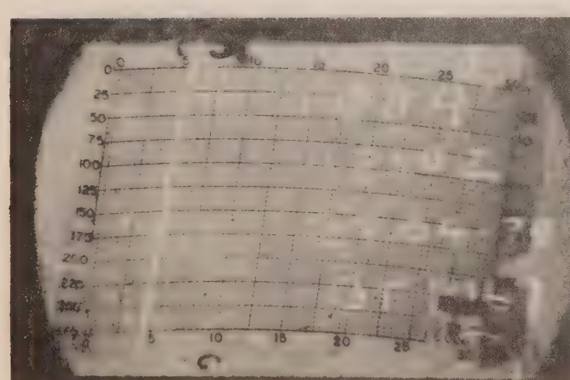
1800 / 24-04-74
50° 12' N.
145° 12' W.



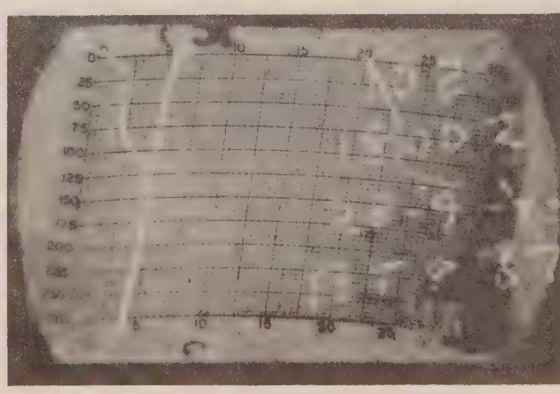
1800 / 25-04-74
49° 55' N.
145° 00' W.



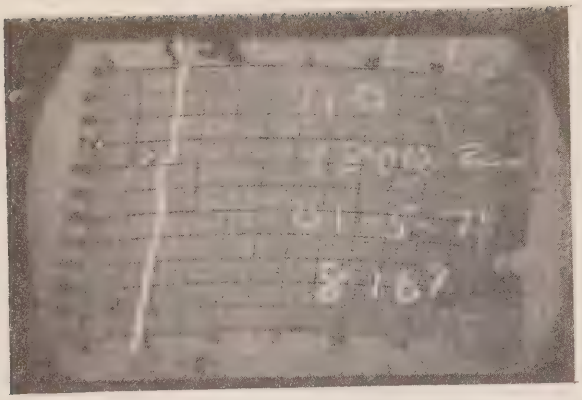
1800 / 26-04-74
50° 14' N.
144° 53' W.



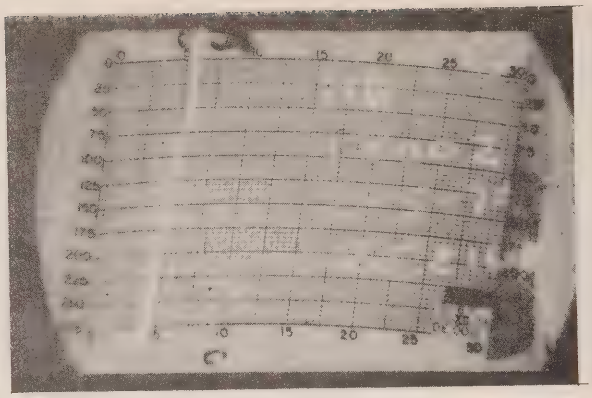
1800 / 27-04-74
49° 50' N.
145° 15' W.



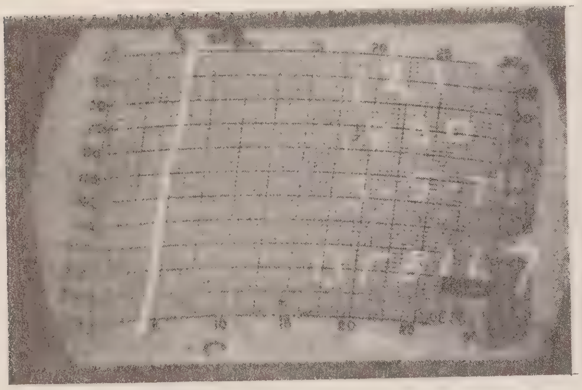
1800 / 28-04-74
50° 03' N.
145° 32' W.



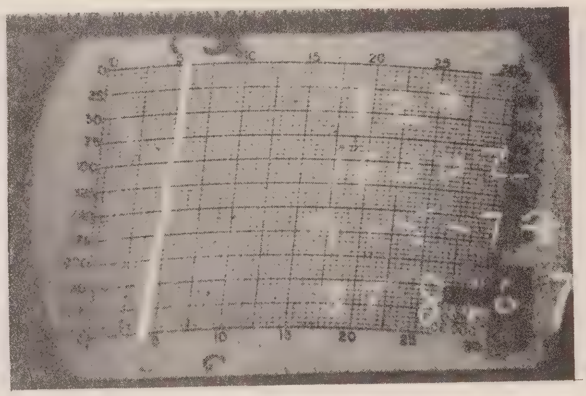
1800 / 01-05-74
49° 56' N.
145° 19' W.



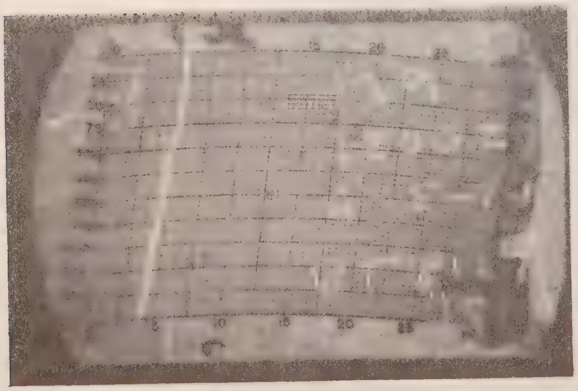
1800 / 02-05-74
49° 55' N.
144° 37' W.



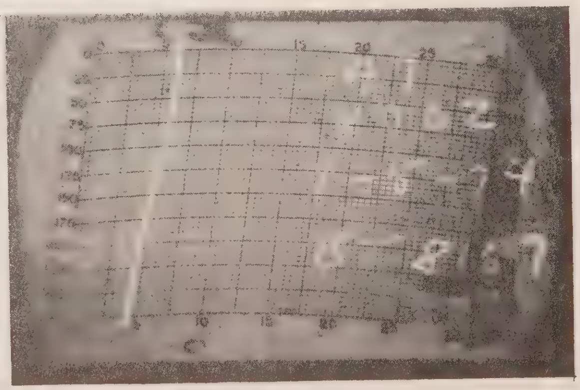
1800 / 03-05-74
49° 58' N.
144° 56' W.



1800 / 04-05-74
50° 15' N.
144° 39' W.

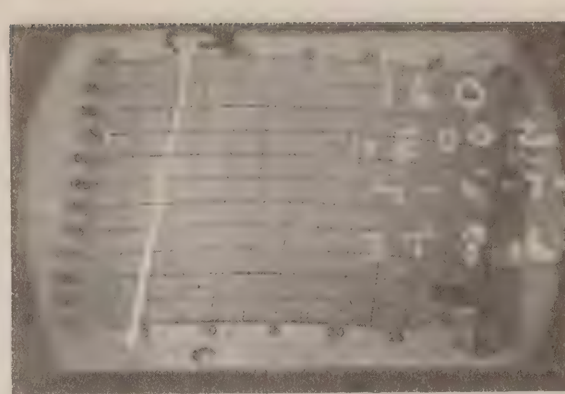


1800 / 06-05-74
50° 02' N.
145° 03' W.

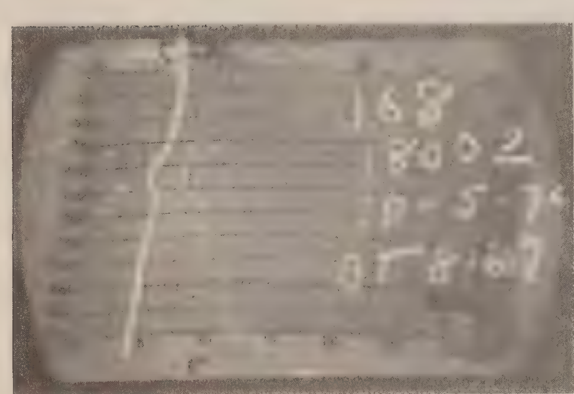


1800 / 07-05-74
50° 05' N.
144° 24' W.

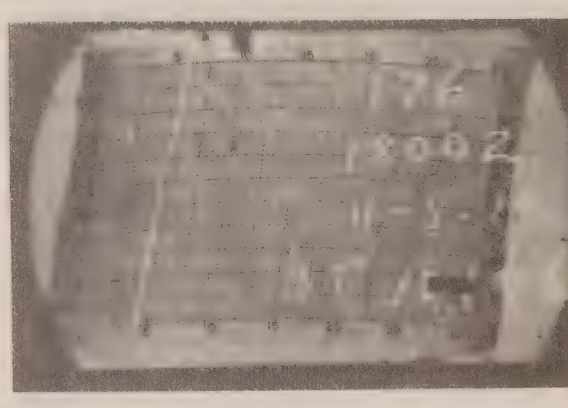
1800 / 08-05-74
50° 09' N.
144° 45' W.



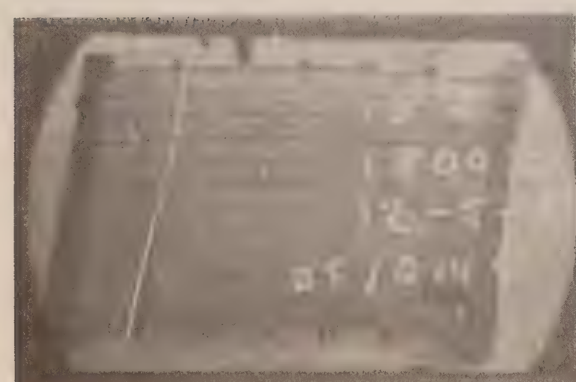
1800 / 09-05-74
49° 52' N.
144° 57' W.



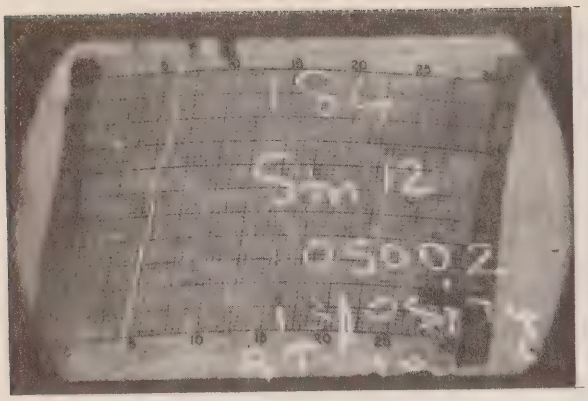
1800 / 10-05-74
49° 47' N.
144° 24' W.



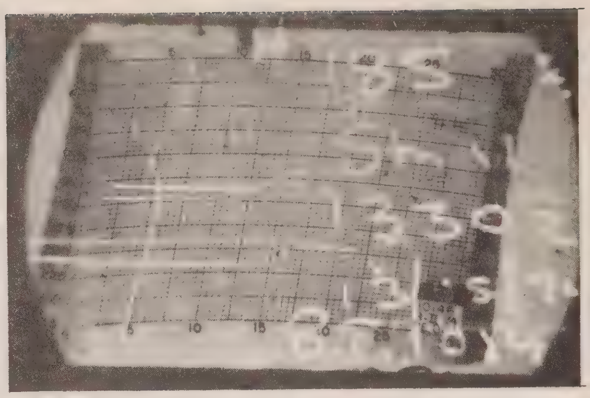
1800 / 11-05-74
50° 03' N.
145° 14' W.



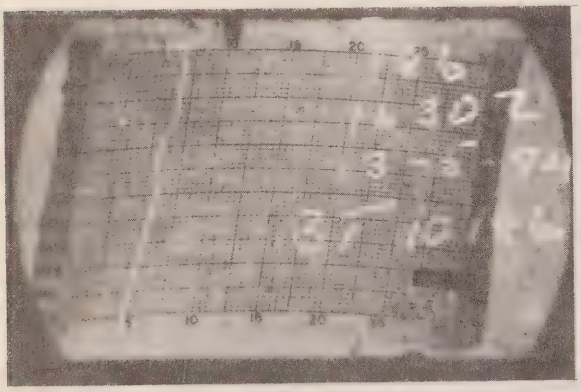
1800 / 12-05-74
50° 09' N.
144° 53' W.



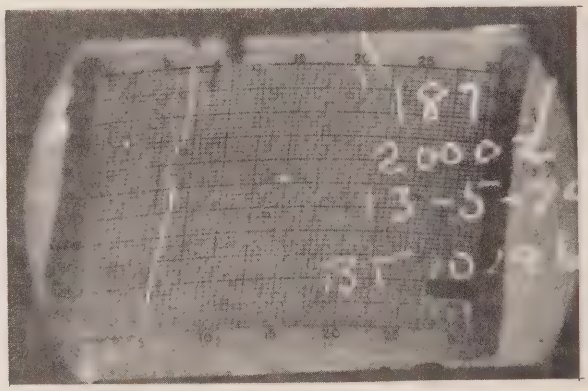
0500 / 13-05-74
49° 56' N.
143° 05' W.



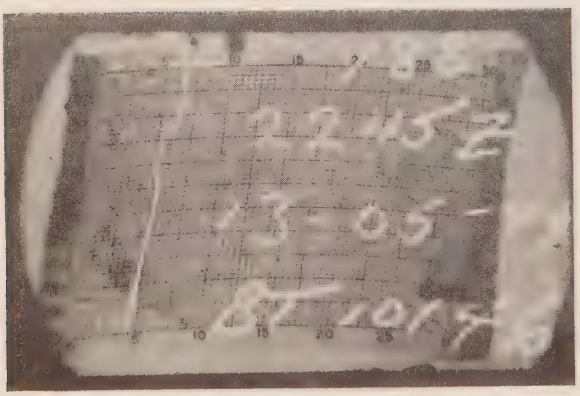
1300 / 13-05-74
49° 40' N.
140° 40' W.



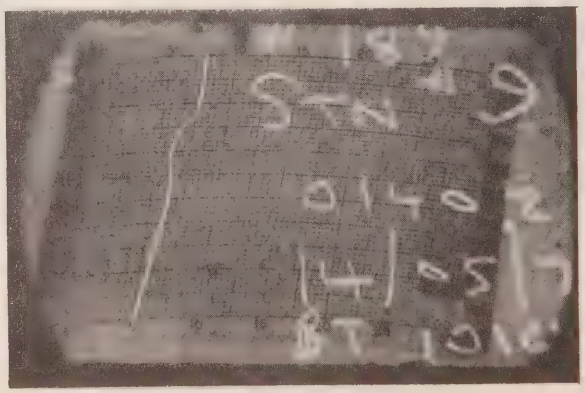
1630 / 13-05-74
49° 06' N.
139° 40' W.



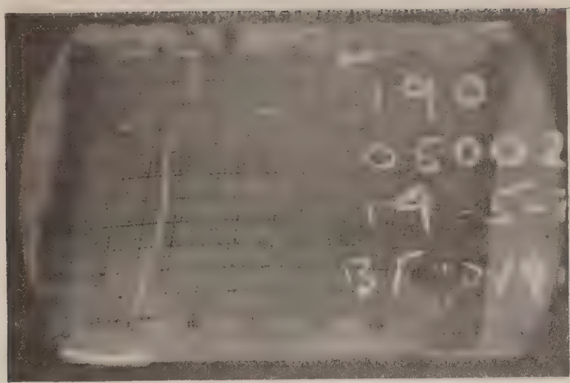
2000 / 13-05-74
49° 01' N.
138° 40' W.



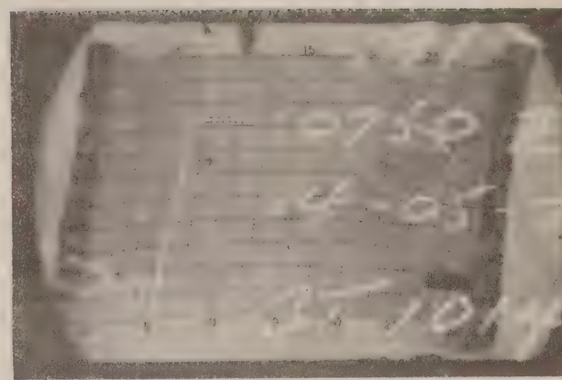
2245 / 13-05-74
49° 27' N.
137° 40' W.



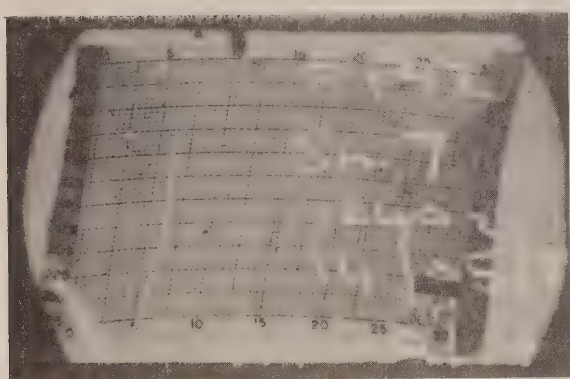
0140 / 14-05-74
49° 25' N.
136° 37' W.



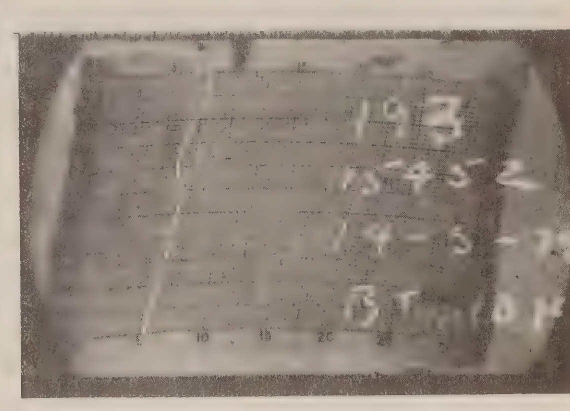
0500 / 14-05-74
49° 18' N.
135° 40' W.



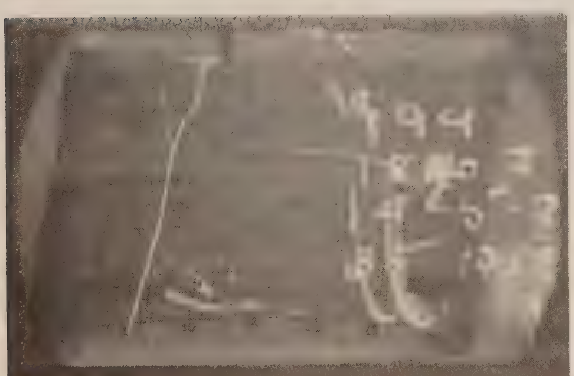
0750 / 14-05-74
49° 09' N.
134° 21' W.



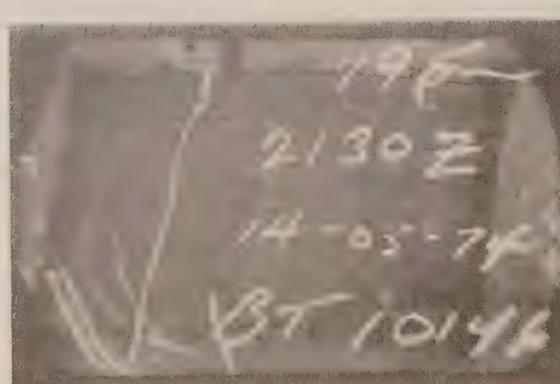
1240 / 14-05-74
49° 05' N.
132° 43' W.



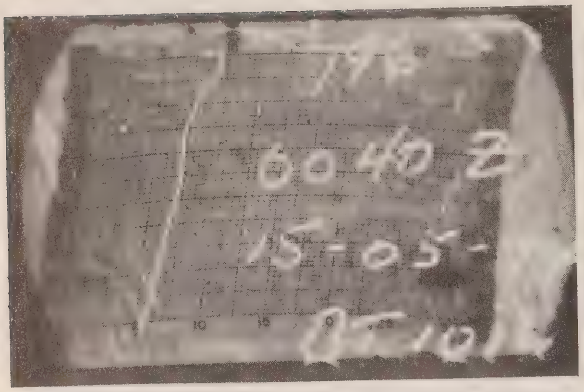
1545 / 14-05-74
49° 01' N.
131° 40' W.



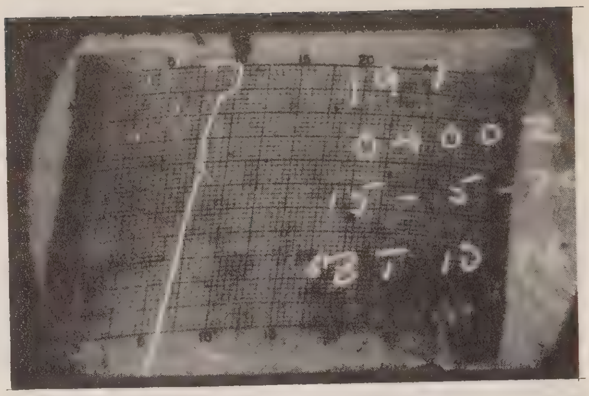
1840 / 14-05-74
48° 57' N.
130° 40' W.



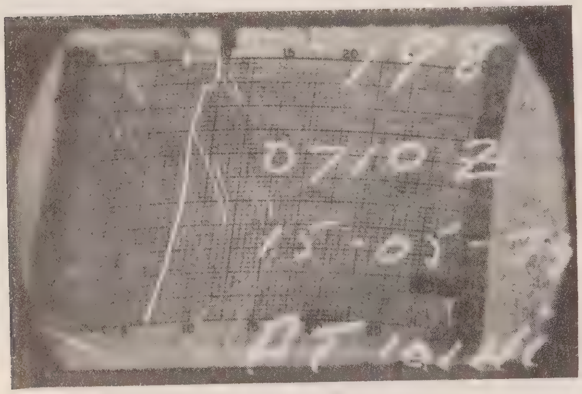
2130 / 14-05-74
48° 53' N.
129° 40' W.



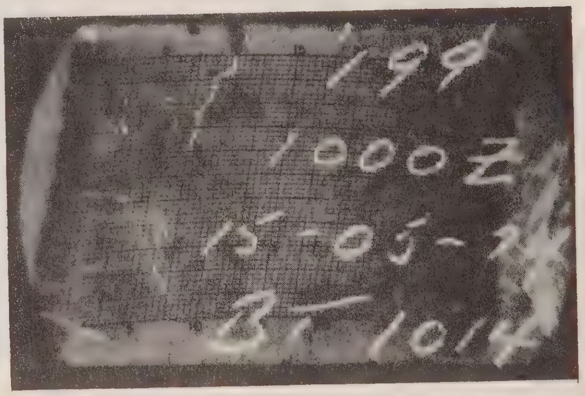
0040 / 15-05-74
48° 48' N.
128° 40' W.



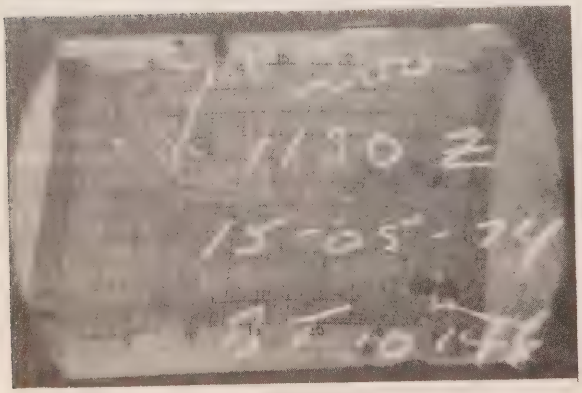
0400 / 15-05-74
48° 44' N.
127° 40' W.



0710 / 15-05-74
48° 40' N.
126° 40' W.



1000 / 15-05-74
48° 37' N.
126° 00' W.



1130 / 15-05-74
48° 35' N.
125° 32' W.

OCEANOGRAPHIC DATA OBTAINED ON CRUISE P-74-5

(CODC REFERENCE NO. 15-74-005)

RESULTS OF HYDROGRAPHIC OBSERVATIONS

(P-74-5)

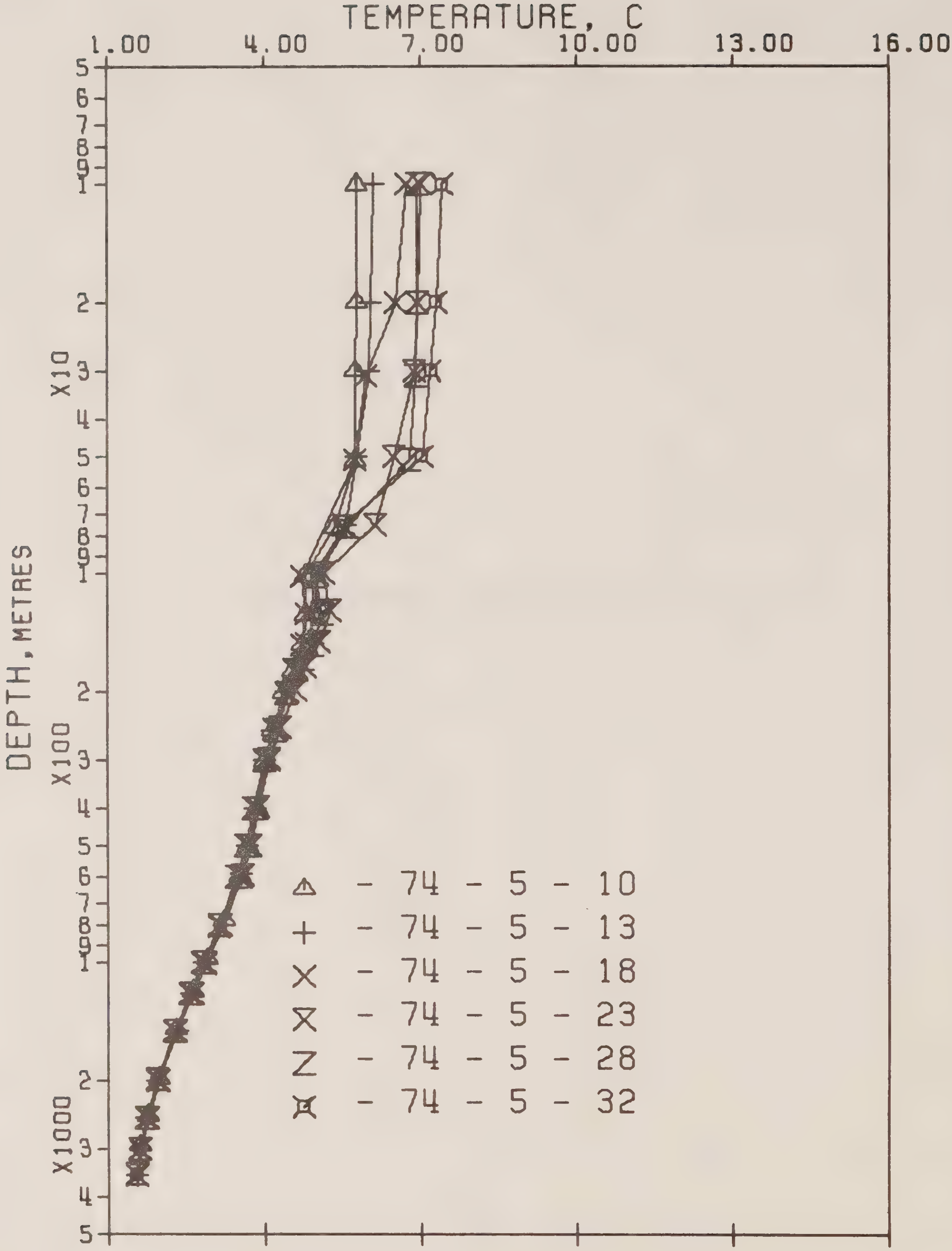


Figure 2 Composite plot of temperature vs $\log_{10}$ depth. P-74-5

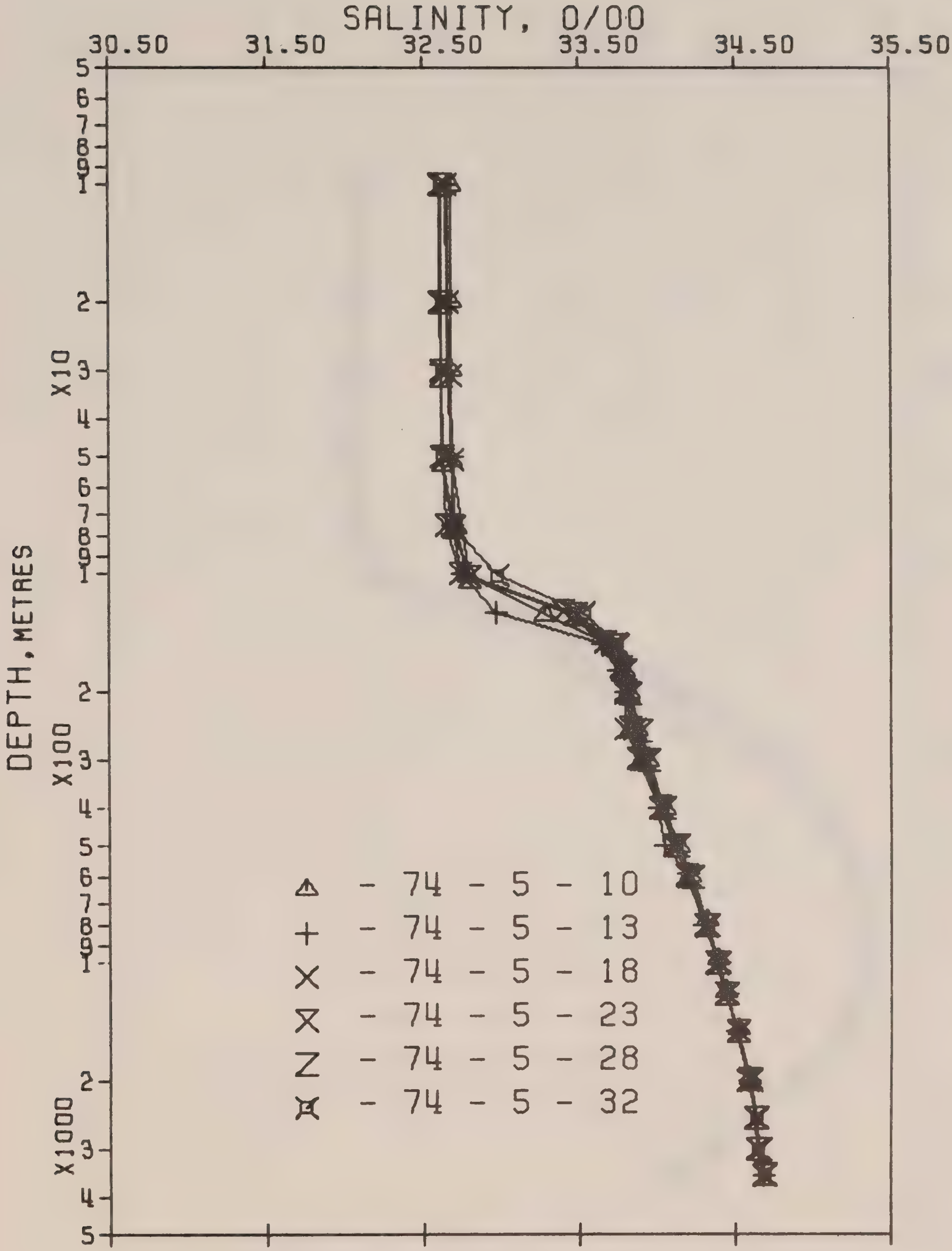


Figure 3 Composite plot of salinity vs $\log_{10}$ depth. P-74-5

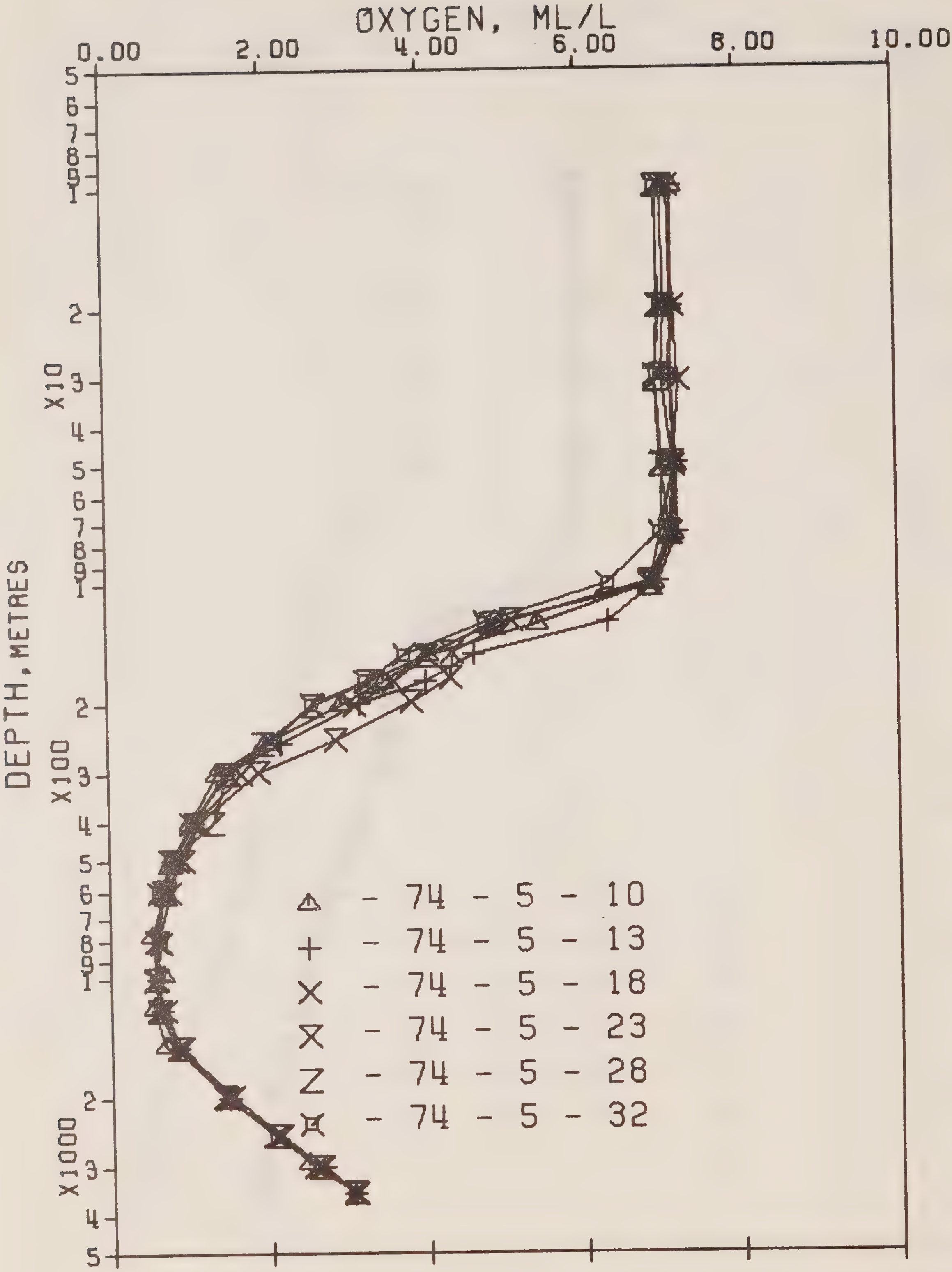
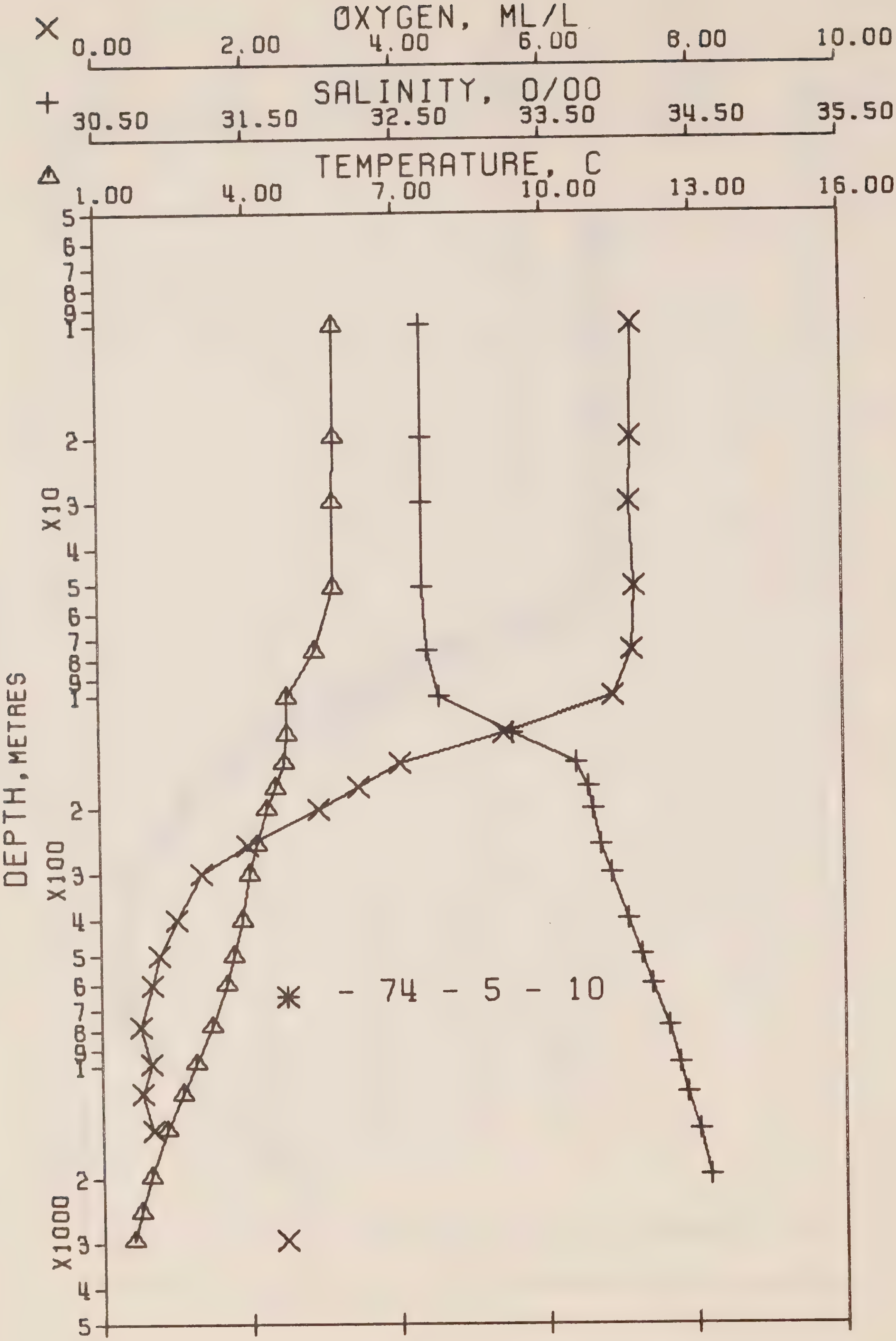
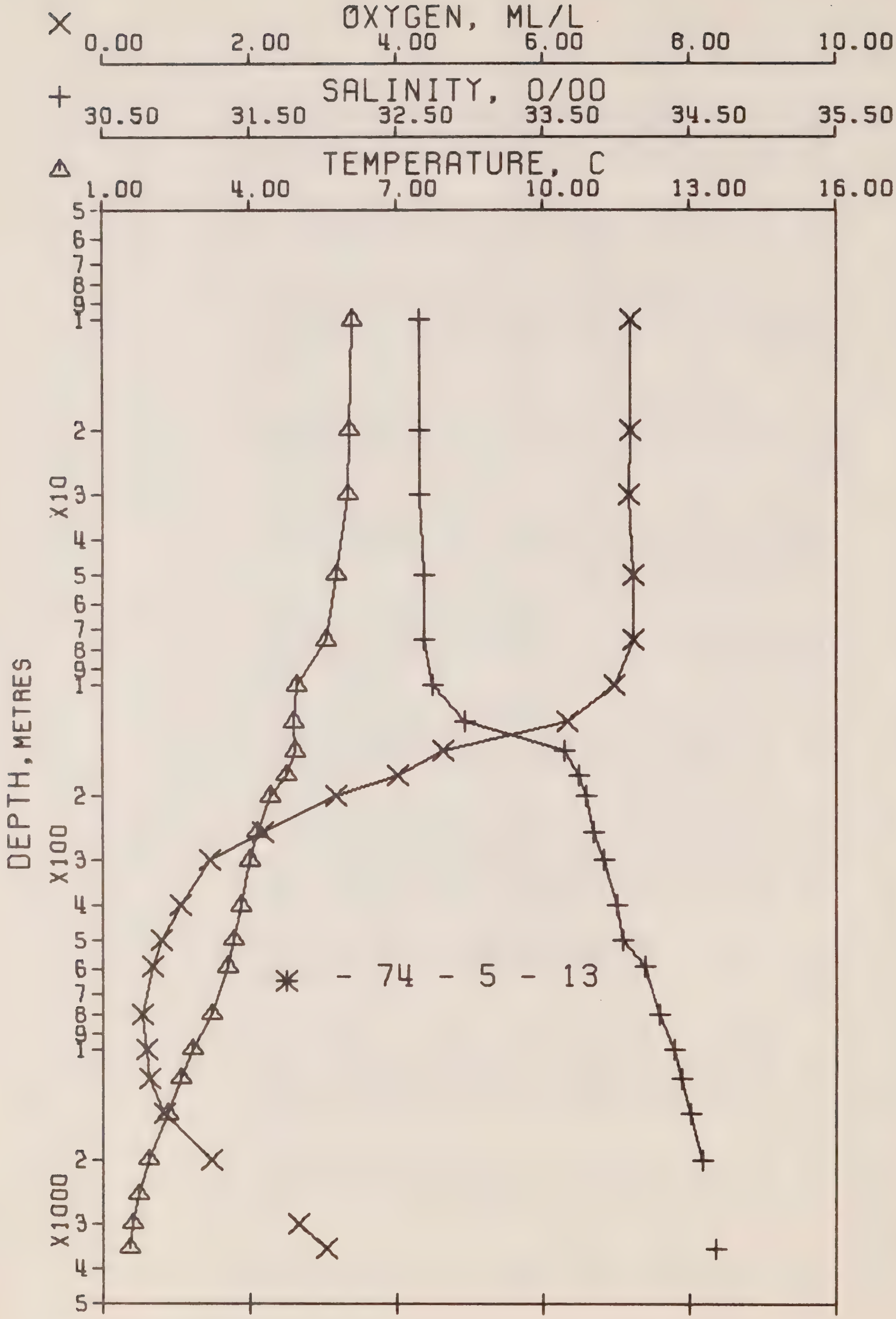


Figure 4 Composite plot of oxygen vs $\log_{10}$ depth. P-74-5


OXYGEN, ML/L
0.00 2.00 4.00 6.00 8.00 10.00
SALINITY, 0/00
30.50 31.50 32.50 33.50 34.50 35.50
TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
✱ - 74 - 5 - 10

OFFSHORE OCEANOGRAPHY GROUP REFERENCE NO. 74- 5- 10 DATE 16/ 5/74
POSITION 50- 0.0 N, 145- 0.0 W GMT 18.7
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	5.78	32.679	0	25.772	223.4	5.78	223.2	0.0	0.0	7.21	1471.
10	5.76	32.683	10	25.778	223.0	5.76	222.7	0.22	0.01	7.21	1471.
20	5.77	32.684	20	25.777	223.2	5.77	222.8	0.45	0.05	7.19	1471.
30	5.74	32.682	30	25.779	223.1	5.74	222.5	0.67	0.10	7.16	1471.
51	5.73	32.683	51	25.781	223.2	5.73	222.3	1.15	0.30	7.22	1472.
76	5.35	32.709	76	25.847	217.1	5.34	216.2	1.70	0.66	7.17	1471.
102	4.79	32.791	101	25.974	205.2	4.78	204.0	2.24	1.15	6.91	1469.
128	4.79	33.283	127	26.364	168.5	4.78	167.0	2.73	1.73	5.44	1470.
153	4.71	33.715	152	26.715	135.5	4.70	133.7	3.11	2.27	4.04	1471.
178	4.53	33.795	177	26.798	127.8	4.52	125.8	3.44	2.82	3.48	1470.
203	4.36	33.822	202	26.837	124.3	4.35	122.0	3.75	3.44	2.95	1470.
254	4.15	33.867	252	26.895	119.1	4.13	116.5	4.37	4.87	1.98	1470.
304	4.01	33.941	302	26.968	112.5	3.99	109.5	4.95	6.53	1.36	1470.
404	3.84	34.052	401	27.074	103.3	3.81	99.5	6.02	10.40	1.02	1472.
505	3.68	34.136	501	27.156	96.1	3.64	91.5	7.03	15.06	0.79	1473.
605	3.52	34.212	600	27.232	89.5	3.48	84.3	7.96	20.31	0.67	1474.
782	3.23	34.317	775	27.344	79.9	3.18	73.6	9.45	30.86	0.53	1475.
987	2.90	34.386	977	27.429	72.5	2.83	65.5	11.00	44.85	0.67	1478.
1191	2.61	34.438	1179	27.496	66.7	2.53	59.1	12.42	60.64	0.55	1480.
1496	2.28	34.520	1480	27.589	58.5	2.18	50.1	14.33	86.69	0.69	1483.
2002	1.96	34.591	1978	27.672	51.8	1.82	42.0	12.96	111.10		1491.
2501	1.75		2471								1474.
2987	1.60		2956							2.45	1460.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32.50
33.50
34.50
35.50
TEMPERATURE, C
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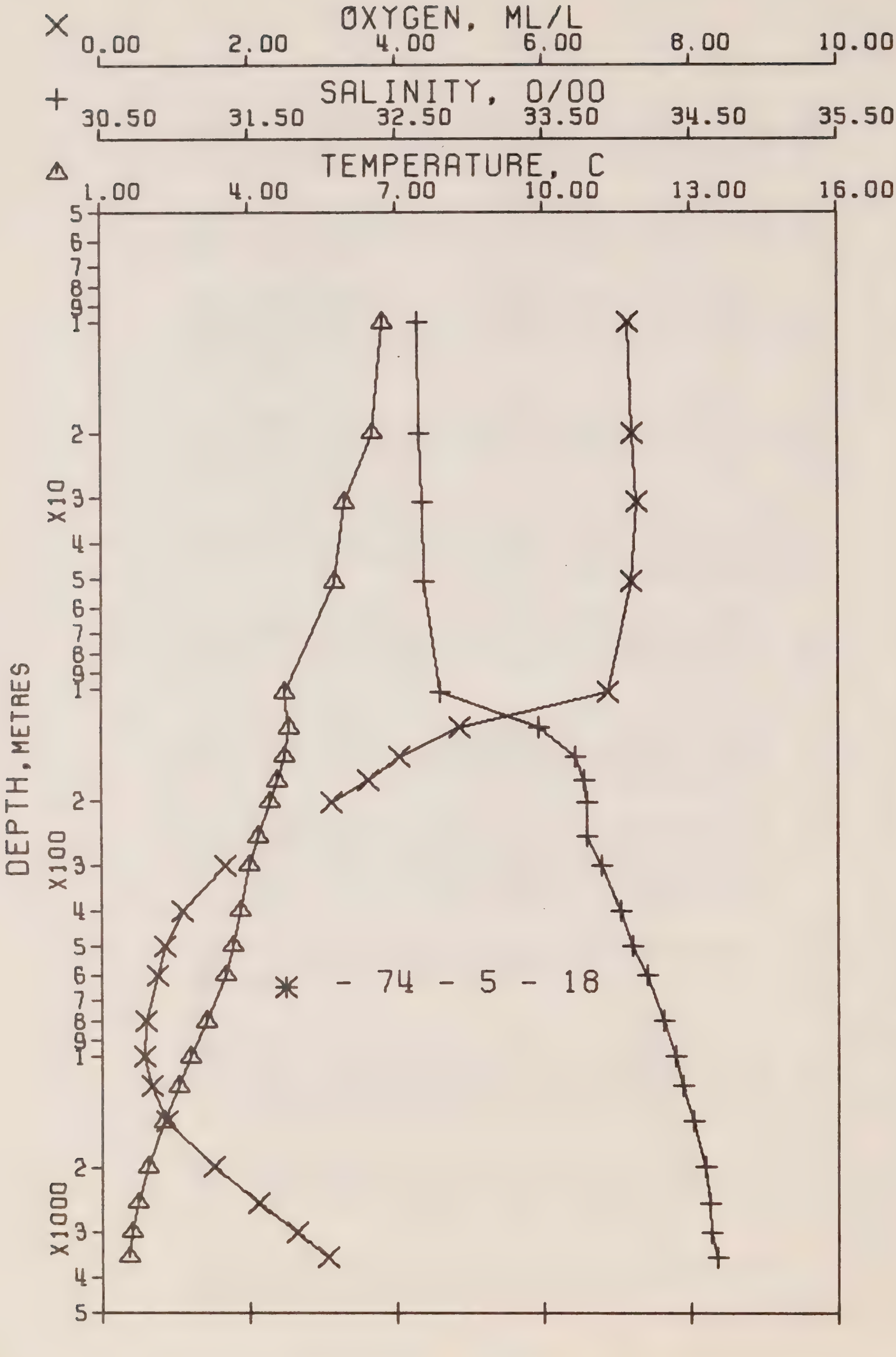
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 74 - 5 - 13

OFFSHORE OCEANOGRAPHY GROUP REFERENCE NO. 74- 5- 13 DATE 20/ 5/74
POSITION 50- 0.0 N, 145- 0.0 W GMT 17.8
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	6.16	32.657	0	25.709	229.5	6.16	229.3	0.0	0.0	7.27	1473.
10	6.09	32.662	10	25.721	228.5	6.09	228.1	0.23	0.01	7.20	1473.
20	6.05	32.663	20	25.727	228.0	6.05	227.6	0.46	0.05	7.20	1473.
30	6.02	32.665	30	25.732	227.6	6.02	227.0	0.69	0.11	7.19	1473.
50	5.76	32.686	50	25.780	223.3	5.76	222.4	1.14	0.29	7.23	1472.
75	5.56	32.689	75	25.806	221.0	5.55	220.0	1.70	0.65	7.24	1471.
101	4.97	32.750	100	25.922	210.1	4.96	208.9	2.25	1.14	6.97	1470.
127	4.91	32.974	126	26.106	193.0	4.90	191.4	2.78	1.76	6.34	1470.
152	4.94	33.649	151	26.637	143.0	4.93	141.1	3.20	2.36	4.64	1471.
177	4.74	33.753	176	26.741	133.2	4.73	131.1	3.55	2.93	4.02	1471.
202	4.43	33.802	201	26.814	126.4	4.42	124.2	3.87	3.56	3.17	1470.
254	4.14	33.851	252	26.883	120.2	4.12	117.6	4.50	5.03	2.17	1470.
304	4.00	33.923	302	26.955	113.8	3.98	110.8	5.09	6.71	1.46	1470.
404	3.83	34.013	401	27.044	106.1	3.80	102.3	6.18	10.65	1.06	1471.
502	3.67	34.047	498	27.087	102.6	3.63	98.2	7.21	15.40	0.81	1472.
596	3.55	34.205	591	27.224	90.3	3.51	85.1	8.12	20.47	0.68	1474.
806	3.22	34.305	799	27.335	80.9	3.16	74.5	9.89	33.17	0.54	1476.
1007	2.84	34.400	997	27.446	71.0	2.77	63.9	11.40	47.18	0.60	1478.
1208	2.58	34.453	1196	27.511	65.4	2.50	57.6	12.77	62.62	0.64	1480.
1514	2.31	34.511	1497	27.580	59.6	2.21	51.0	14.67	88.99	0.85	1484.
2025	1.94	34.589	2000	27.672	51.8	1.80	42.0	17.50	139.90	1.49	1491.
2539	1.73	34.630*	2505	27.721	47.9	1.55	37.2	20.04	199.14		1499.
3056	1.60	34.654*	3011	27.750	46.1	1.37	34.2	22.46	268.20	2.66	1507.
3573	1.53	34.678	3517	27.774	44.8	1.25	31.6	24.81	347.61	3.03	1515.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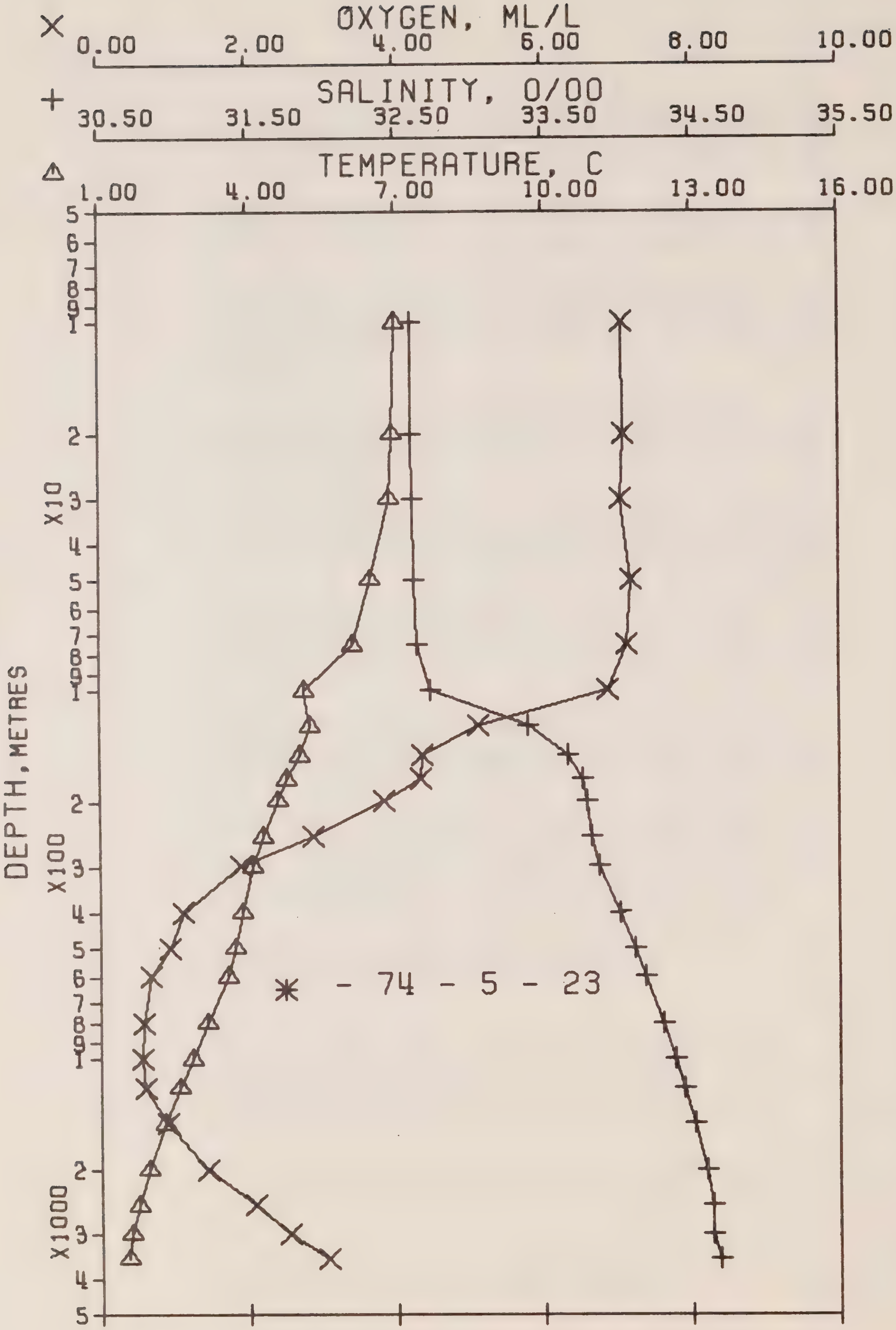
TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
* - 74 - 5 - 18

OFFSHORE OCEANOGRAPHY GROUP REFERENCE NO. 74- 5- 18 DATE 27/ 5/74
POSITION 50- 0.0 N, 145- 0.0 W GMT 17.9
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	6.82	32.647	0	25.616	238.3	6.82	238.1	0.0	0.0	7.21	1475.
10	6.74	32.652	10	25.630	237.1	6.74	236.7	0.24	0.01	7.16	1475.
20	6.52	32.656	20	25.662	234.2	6.52	233.7	0.48	0.05	7.21	1474.
31	5.96	32.681	31	25.752	225.7	5.96	225.1	0.73	0.12	7.29	1472.
51	5.73	32.691	51	25.788	222.5	5.73	221.8	1.18	0.30	7.21	1472.
103	4.71	32.805	102	25.994	203.3	4.70	202.1	2.31	1.21	6.87	1469.
128	4.81	33.466	127	26.506	155.0	4.80	153.5	2.76	1.73	4.86	1470.
153	4.73	33.716	152	26.713	135.7	4.72	133.8	3.12	2.25	4.04	1471.
178	4.57	33.784	177	26.785	129.1	4.56	127.0	3.45	2.81	3.63	1471.
203	4.42	33.804	202	26.817	126.2	4.41	124.0	3.78	3.43	3.12	1470.
253	4.18	33.801	251	26.839	124.3	4.16	121.7	4.40	4.88		1470.
303	4.00	33.904	301	26.940	115.2	3.98	112.2	5.00	6.59	1.69	1470.
403	3.83	34.032	400	27.059	104.6	3.80	100.8	6.09	10.52	1.09	1471.
503	3.67	34.115	499	27.141	97.5	3.63	93.1	7.10	15.18	0.85	1472.
604	3.52	34.210	599	27.231	89.7	3.48	84.5	8.04	20.51	0.76	1474.
808	3.14	34.324	801	27.358	78.6	3.08	72.4	9.75	32.80	0.59	1476.
1011	2.81	34.402	1001	27.450	70.5	2.74	63.5	11.25	46.72	0.58	1478.
1213	2.56	34.451	1201	27.511	65.3	2.48	57.6	12.62	62.27	0.68	1480.
1517	2.27	34.521	1500	27.591	58.4	2.17	50.0	14.49	88.28	0.88	1484.
2024	1.92	34.601	1999	27.683	50.6	1.78	41.0	17.23	137.59	1.53	1491.
2534	1.72	34.634	2500	27.725	47.5	1.54	36.8	19.71	195.29	2.11	1499.
3051	1.59	34.643	3006	27.741	46.7	1.36	34.9	22.14	264.47	2.64	1507.
3577	1.54	34.676	3520	27.772	45.2	1.26	31.7	24.55	346.04	3.07	1516.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TEMPERATURE, C
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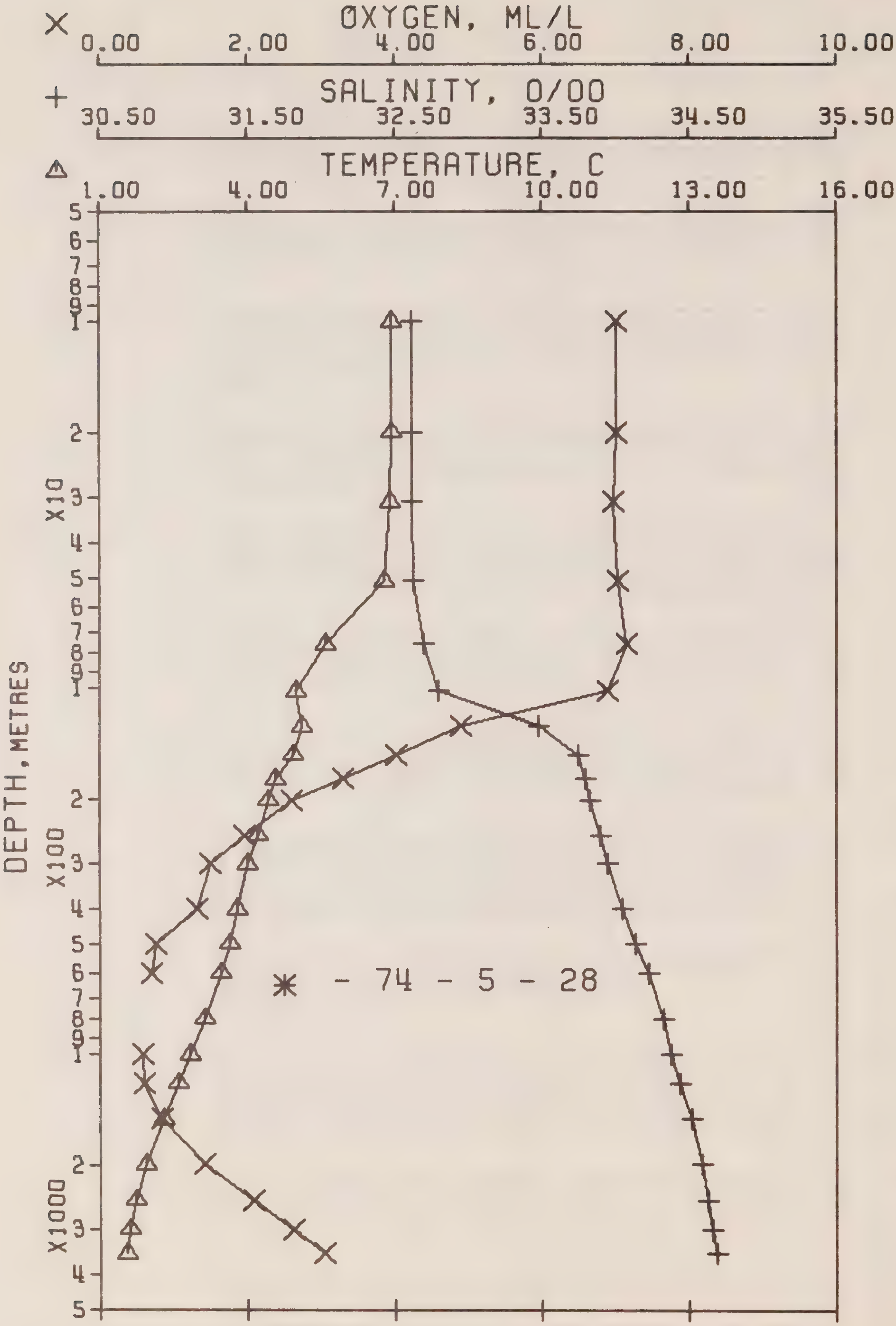
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 74 - 5 - 23

OFFSHORE OCEANOGRAPHY GROUP REFERENCE NO. 74- 5- 23 DATE 3/ 6/74
POSITION 50- 0.0 N, 145- 0.0 W GMT 18.0
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	7.34	32.607	0	25.514	248.0	7.34	247.8	0.0	0.0		1477.
10	7.01	32.610	10	25.562	243.6	7.01	243.3	0.25	0.01	7.08	1476.
20	6.93	32.612	20	25.574	242.6	6.93	242.1	0.49	0.05	7.10	1476.
30	6.88	32.616	30	25.584	241.8	6.88	241.2	0.74	0.11	7.06	1476.
50	6.50	32.626	50	25.641	236.6	6.50	235.6	1.22	0.31	7.19	1475.
75	6.13	32.646	75	25.704	230.8	6.12	229.8	1.81	0.69	7.14	1474.
101	5.14	32.743	100	25.897	212.5	5.13	211.3	2.37	1.20	6.88	1470.
126	5.27	33.398	125	26.400	165.2	5.26	163.5	2.85	1.74	5.13	1472.
151	5.04	33.669	150	26.641	142.5	5.03	140.6	3.23	2.28	4.36	1472.
175	4.77	33.771	174	26.752	132.2	4.76	130.1	3.56	2.83	4.35	1471.
200	4.59	33.797	199	26.793	128.5	4.57	126.3	3.89	3.46	3.84	1471.
251	4.31	33.826	249	26.846	123.8	4.29	121.2	4.52	4.92	2.87	1471.
301	4.08	33.883	299	26.915	117.6	4.06	114.6	5.13	6.63	1.91	1471.
402	3.87	34.025	399	27.049	105.5	3.84	101.8	6.25	10.65	1.11	1472.
502	3.72	34.116	498	27.136	98.0	3.68	93.4	7.27	15.33	0.95	1473.
601	3.59	34.195	596	27.212	91.5	3.55	86.2	8.20	20.60	0.69	1474.
806	3.17	34.309	799	27.343	80.0	3.11	73.7	9.96	33.17	0.57	1476.
1009	2.86	34.393	999	27.438	71.8	2.79	64.6	11.49	47.32	0.56	1478.
1211	2.59	34.454	1199	27.510	65.4	2.51	57.6	12.87	62.99	0.60	1480.
1517	2.30	34.521	1500	27.588	58.8	2.20	50.2	14.76	89.23	0.89	1484.
2027	1.95	34.598	2002	27.678	51.2	1.81	41.5	17.54	139.40	1.44	1491.
2540	1.74	34.637	2506	27.725	47.6	1.56	36.7	20.05	197.89	2.08	1499.
3055	1.60	34.639	3010	27.738	47.2	1.37	35.3	22.48	267.48	2.53	1507.
3572	1.53	34.686	3516	27.780	44.3	1.25	30.9	24.86	347.59	3.06	1515.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4.00
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16.00
DEPTH, METRES
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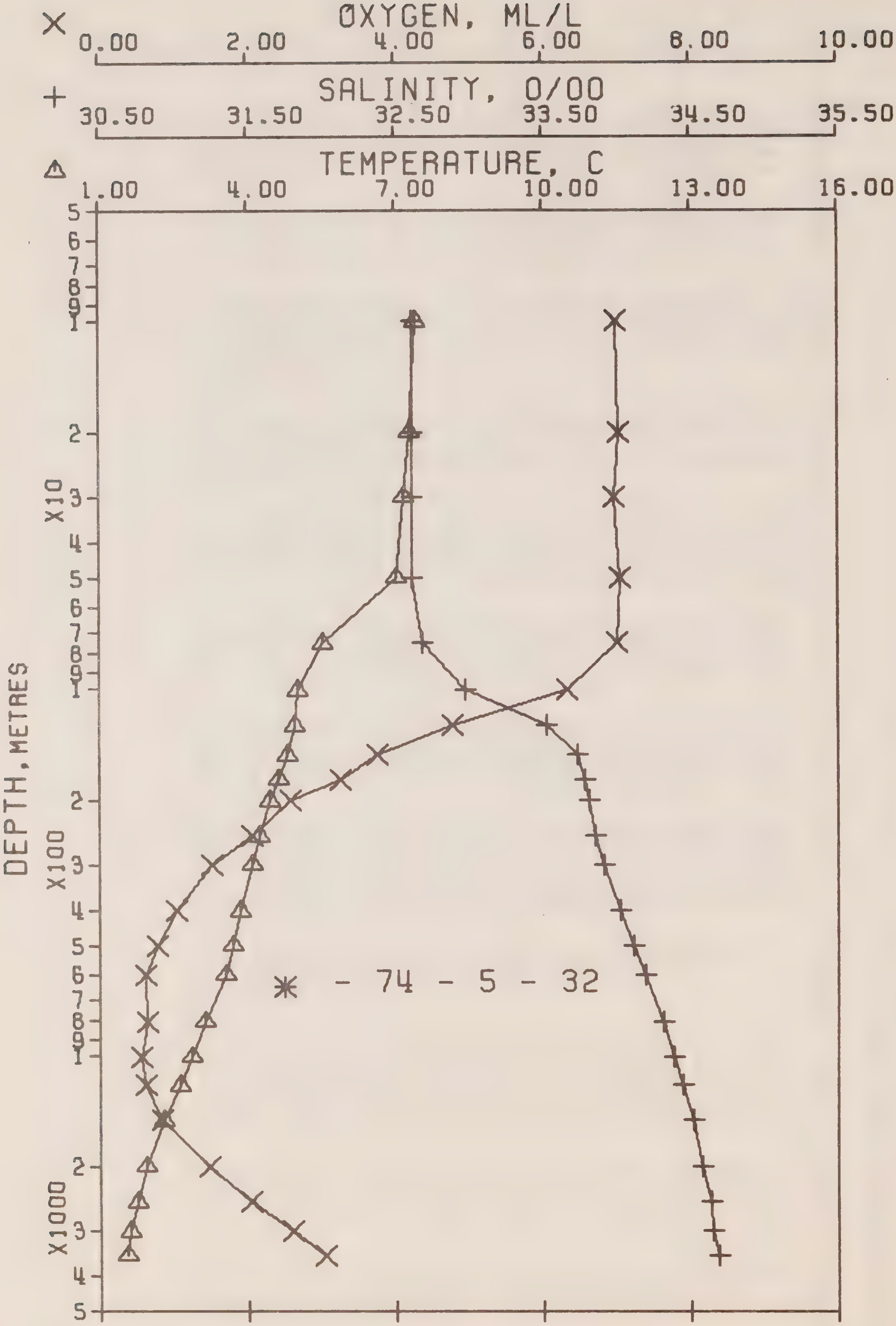
X100
X1000
* - 74 - 5 - 28

OFFSHORE OCEANOGRAPHY GROUP REFERENCE NO. 74- 5- 28 DATE 11/ 6/74
POSITION 50- 0.0 N. 145- 0.0 W GMT 17.8
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	7.05	32.625	0	25.568	242.8	7.05	242.6	0.0	0.0	7.02	1476.
10	6.93	32.623	10	25.583	241.6	6.93	241.3	0.24	0.01	7.02	1476.
20	6.94	32.624	20	25.582	241.8	6.94	241.4	0.49	0.05	7.02	1476.
31	6.92	32.624	31	25.585	241.7	6.92	241.1	0.75	0.12	6.98	1476.
51	6.79	32.635	51	25.610	239.5	6.79	238.5	1.24	0.32	7.05	1476.
76	5.58	32.697	76	25.810	220.6	5.57	219.6	1.82	0.70	7.15	1472.
103	4.99	32.803	102	25.962	206.4	4.98	205.2	2.39	1.22	6.90	1470.
128	5.11	33.476	127	26.480	157.6	5.10	155.9	2.85	1.76	4.89	1472.
153	4.92	33.749	152	26.718	135.3	4.91	133.3	3.21	2.28	4.01	1472.
178	4.57	33.796	177	26.794	128.2	4.56	126.1	3.54	2.83	3.29	1471.
203	4.41	33.830	202	26.838	124.2	4.40	121.9	3.85	3.45	2.59	1470.
254	4.21	33.896	252	26.912	117.5	4.19	114.9	4.46	4.87	1.96	1470.
304	4.00	33.950	302	26.976	111.8	3.98	108.7	5.04	6.51	1.51	1470.
404	3.80	34.054	401	27.079	102.7	3.77	98.9	6.11	10.37	1.33	1471.
504	3.63	34.145	500	27.168	94.9	3.59	90.5	7.10	14.94	0.75	1472.
604	3.46	34.227	599	27.250	87.8	3.42	82.6	8.01	20.09	0.71	1473.
805	3.13	34.327	798	27.361	78.2	3.07	72.0	9.67	32.00		1475.
1008	2.83	34.384	998	27.434	72.0	2.76	65.1	11.18	46.01	0.58	1478.
1210	2.60	34.443	1198	27.501	66.3	2.52	58.6	12.58	61.85	0.60	1480.
1516	2.28	34.523	1499	27.592	58.4	2.18	49.9	14.48	88.18	0.84	1484.
2024	1.93	34.588	1999	27.672	51.7	1.79	42.0	17.24	138.11	1.41	1491.
2534	1.73	34.632	2500	27.722	47.8	1.55	37.1	19.77	196.84	2.08	1499.
3046	1.59	34.664	3001	27.758	45.2	1.36	33.4	22.14	264.22	2.63	1507.
3559	1.54	34.686	3503	27.780	44.3	1.26	31.0	24.43	341.47	3.03	1515.



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32.50
33.50
34.50
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TEMPERATURE, C
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7.00
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16.00
DEPTH, METRES
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X100
X1000
* - 74 - 5 - 32

OFFSHORE OCEANOGRAPHY GROUP REFERENCE NO. 74- 5- 32 DATE 17/ 6/74
POSITION 50- 0.0 N, 145- 0.0 W GMT 17.8
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	7.51	32.617	0	25.499	249.5	7.51	249.2	0.0	0.0		1478.
10	7.42	32.619	10	25.513	248.2	7.42	247.9	0.25	0.01	6.99	1478.
20	7.30	32.622	20	25.532	246.7	7.30	246.1	0.50	0.05	7.04	1477.
30	7.19	32.623	30	25.548	245.3	7.19	244.6	0.75	0.11	6.99	1477.
50	7.02	32.623	50	25.570	243.3	7.02	242.4	1.24	0.32	7.06	1477.
75	5.52	32.693	75	25.814	220.2	5.51	219.2	1.83	0.69	7.02	1471.
102	5.02	32.979	101	26.098	193.5	5.01	192.2	2.37	1.19	6.34	1470.
127	4.95	33.534	126	26.544	151.5	4.94	149.8	2.81	1.69	4.77	1471.
152	4.82	33.745	151	26.726	134.4	4.81	132.6	3.16	2.19	3.75	1471.
177	4.64	33.788	176	26.780	129.6	4.63	127.4	3.49	2.75	3.25	1471.
202	4.44	33.820	201	26.827	125.2	4.43	123.0	3.81	3.37	2.58	1470.
253	4.23	33.858	251	26.879	120.6	4.21	117.9	4.43	4.80	2.07	1470.
303	4.09	33.919	301	26.942	115.0	4.07	112.0	5.02	6.49	1.51	1471.
404	3.85	34.035	401	27.059	104.6	3.82	100.8	6.13	10.47	1.05	1472.
504	3.70	34.125	500	27.146	97.1	3.66	92.6	7.14	15.13	0.78	1473.
604	3.54	34.199	599	27.220	90.7	3.50	85.5	8.07	20.43	0.61	1474.
813	3.14	34.321	806	27.355	78.8	3.08	72.6	9.84	33.17	0.63	1476.
1013	2.86	34.391	1003	27.437	71.9	2.79	64.8	11.33	47.10	0.57	1478.
1213	2.61	34.450	1201	27.506	66.0	2.53	58.1	12.71	62.76	0.61	1480.
1519	2.28	34.523	1502	27.592	58.4	2.18	49.9	14.60	89.06	0.84	1484.
2031	1.93	34.584	2006	27.669	52.0	1.79	42.4	17.40	139.75	1.47	1491.
2547	1.74	34.637	2513	27.725	47.6	1.56	36.7	19.95	199.33	2.04	1499.
3063	1.59	34.650	3018	27.747	46.3	1.36	34.4	22.37	268.41	2.60	1507.
3573	1.53	34.686	3517	27.780	44.3	1.25	30.9	24.68	346.64	3.04	1515.

RESULTS OF STD OBSERVATIONS

(P-74-5)

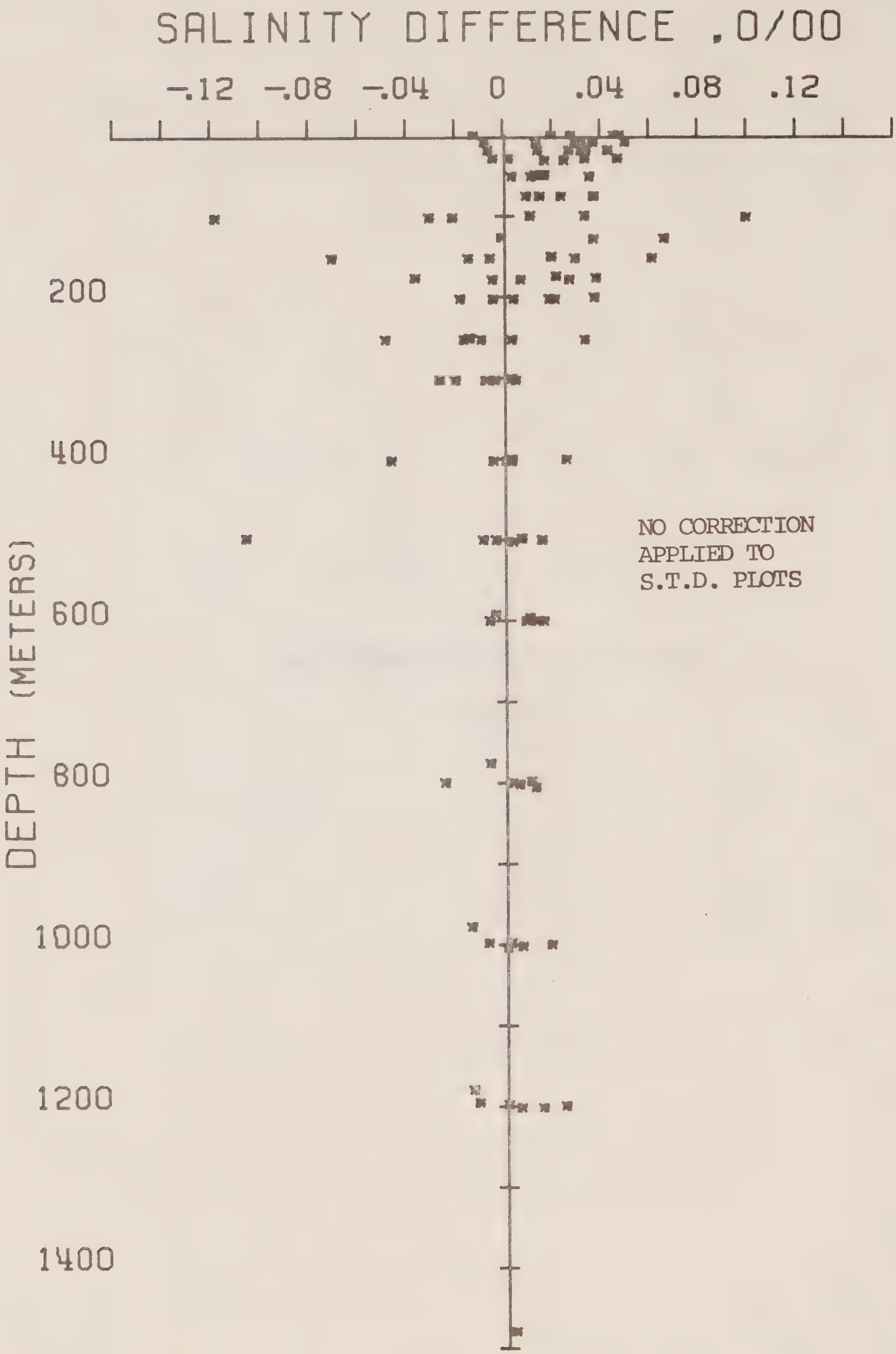


Figure 5 Salinity difference between hydro data and STD. P-74-5

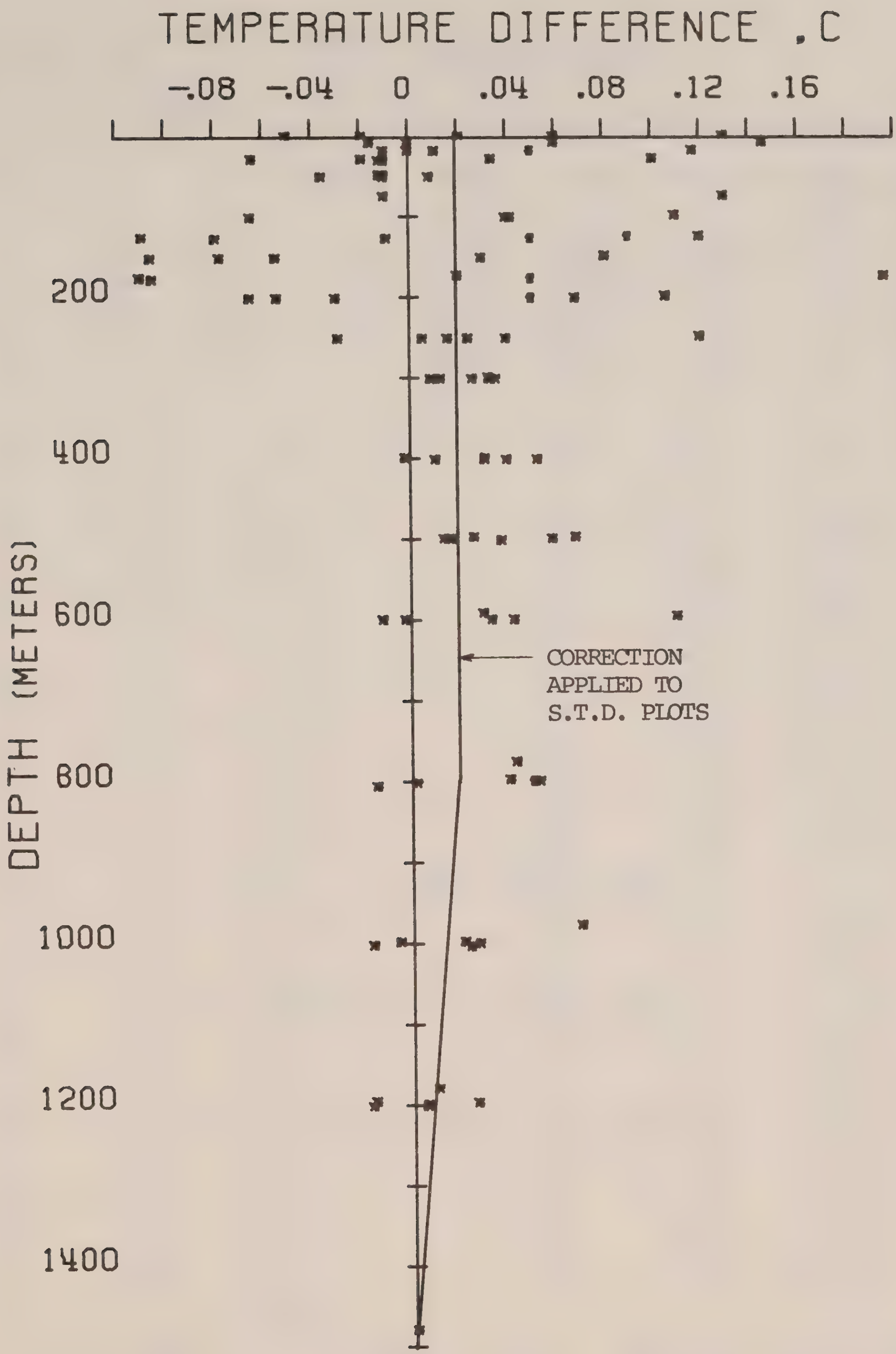
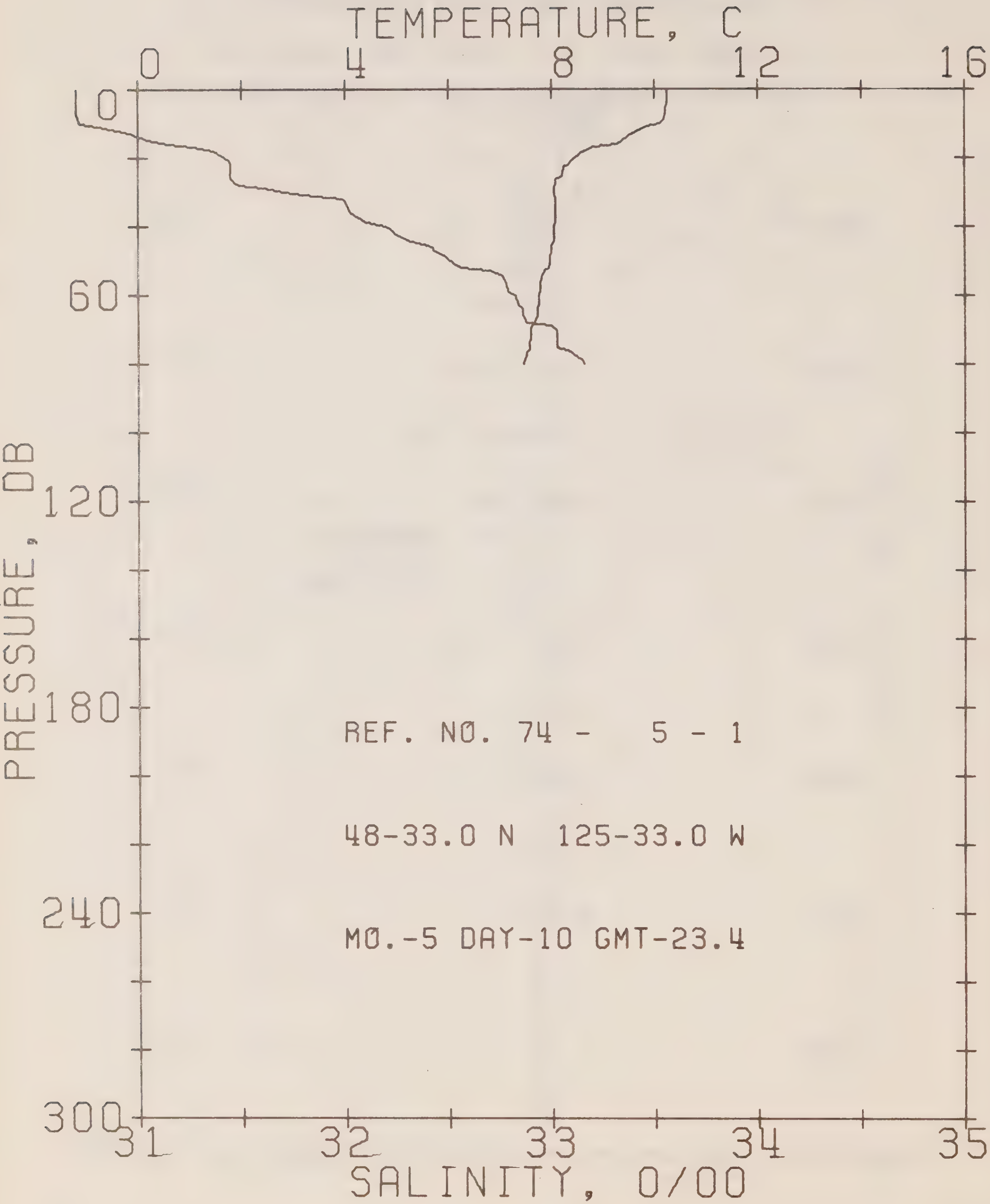


Figure 6 Temperature difference between hydro data and STD. P-74-5

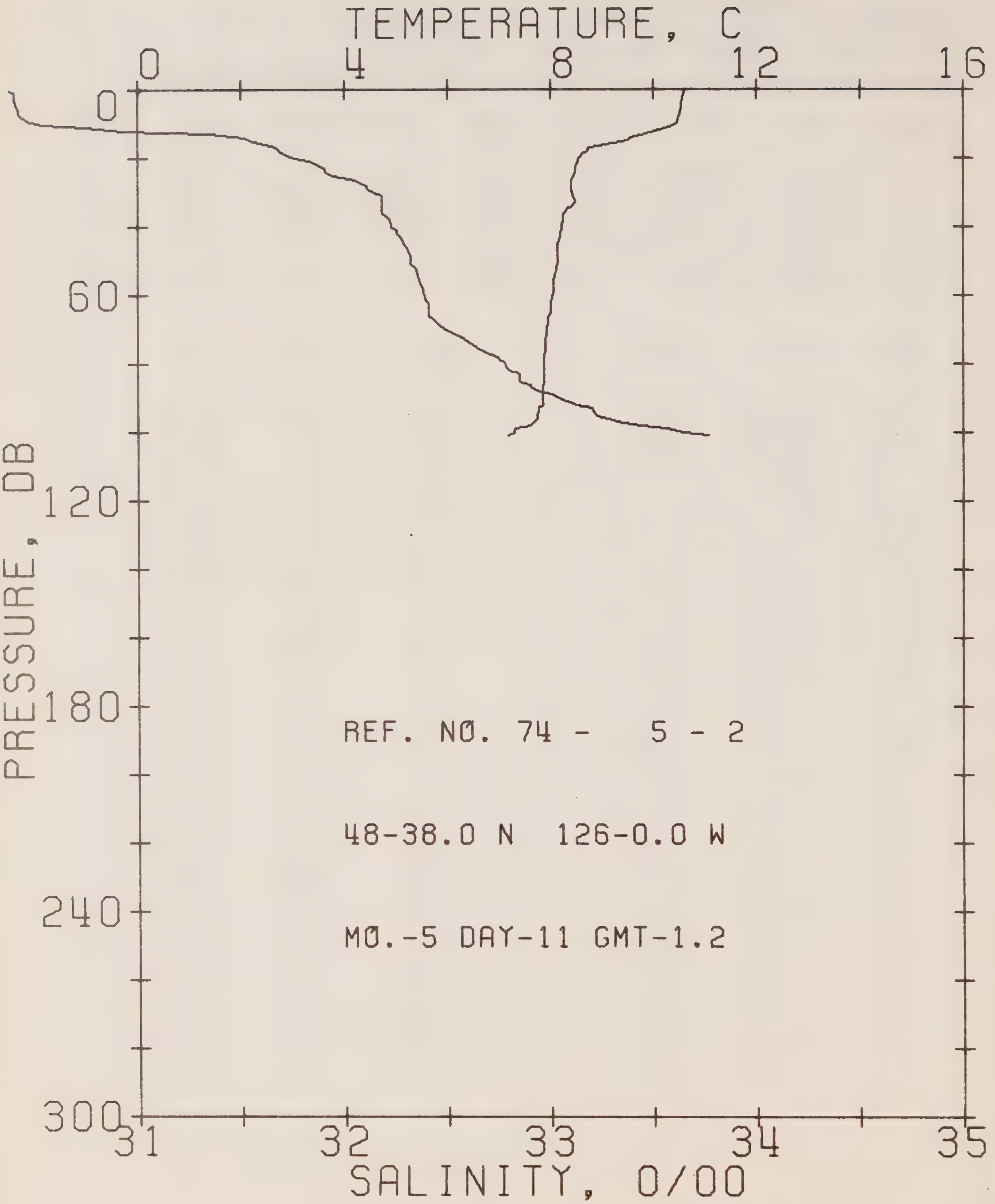


TEMPERATURE, C
0
4
8
12
16
10
60
120
180
240
300
PRESSURE, DB
REF. NØ. 74 - 5 - 1
48-33.0 N 125-33.0 W
MØ.-5 DAY-10 GMT-23.4
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 1 DATE 10/ 5/74
POSITION 48-33.0N, 125-33.0W GMT 23.4
RESULTS OF STP CAST 61 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	10.23	30.70	0	23.59	431.3	0.0	0.0	1486.
10	10.11	30.72	10	23.62	428.3	0.43	0.02	1485.
20	8.46	31.42	20	24.43	352.0	0.82	0.08	1480.
30	8.05	31.71	30	24.71	324.8	1.16	0.17	1479.
50	7.97	32.51	50	25.35	264.5	1.74	0.40	1480.
75	7.58	33.03	75	25.81	220.8	2.33	0.78	1480.

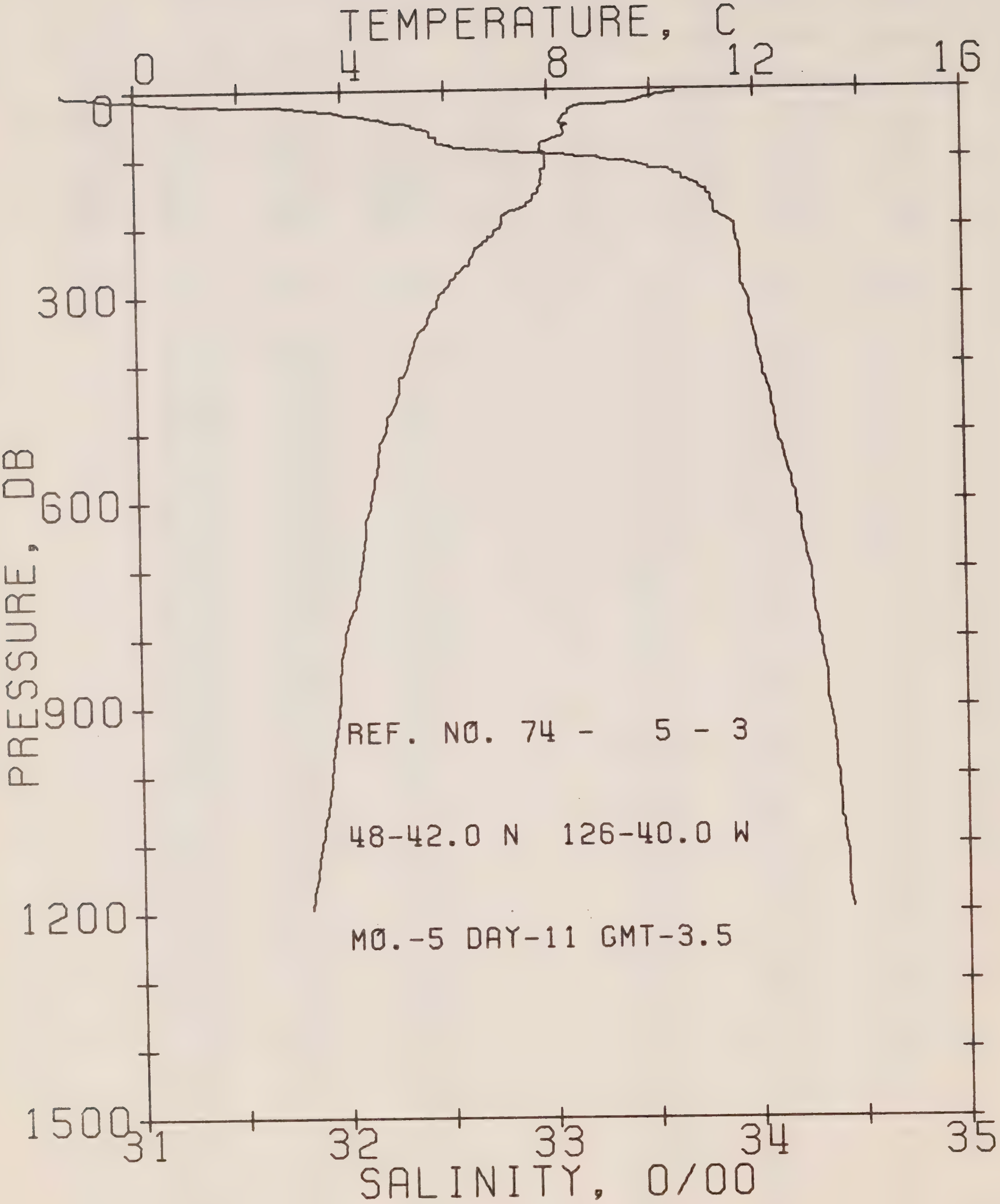
DEPTH	TEMP	SAL	DEPTH	TEMP	SAL
0.	10.23	30.70	42.	8.05	32.24
4.	10.23	30.70	44.	8.04	32.30
6.	10.22	30.70	45.	8.02	32.38
7.	10.21	30.70	46.	8.00	32.42
9.	10.18	30.71	47.	7.99	32.43
10.	10.11	30.72	48.	7.99	32.47
11.	9.85	30.81	49.	7.97	32.49
13.	9.56	30.96	51.	7.97	32.53
15.	9.39	31.05	52.	7.94	32.56
16.	9.29	31.15	53.	7.87	32.70
17.	8.82	31.27	54.	7.83	32.75
18.	8.63	31.37	55.	7.80	32.77
20.	8.46	31.42	57.	7.79	32.78
21.	8.40	31.44	59.	7.78	32.79
22.	8.32	31.45	60.	7.77	32.83
23.	8.24	31.45	61.	7.76	32.83
25.	8.21	31.45	63.	7.75	32.84
26.	8.11	31.45	64.	7.74	32.86
27.	8.09	31.46	66.	7.73	32.86
28.	8.08	31.49	68.	7.67	32.88
29.	8.05	31.61	69.	7.63	33.00
30.	8.05	31.71	70.	7.60	33.02
31.	8.05	31.80	71.	7.59	33.03
32.	8.08	31.99	72.	7.59	33.03
33.	8.09	32.00	75.	7.58	33.03
34.	8.09	32.01	76.	7.56	33.08
36.	8.09	32.03	77.	7.53	33.10
38.	8.08	32.08	78.	7.51	33.13
39.	8.08	32.11	79.	7.50	33.15
40.	8.05	32.20	80.	7.47	33.16
41.	8.05	32.22			


TEMPERATURE, C
0
4
8
12
16
0
60
120
180
240
300
PRESSURE, DB
REF. NO. 74 - 5 - 2
48-38.0 N 126-0.0 W
MO.-5 DAY-11 GMT-1.2
31
32
33
34
35
SALINITY, O/OO

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 2 DATE 11/ 5/74
POSITION 48-38.0N. 126- 0.0W GMT 1.2
RESULTS OF STP CAST 83 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	10.57	30.38	0	23.28	460.4	0.0	0.0	1487.
10	10.44	30.54	10	23.43	446.8	0.46	0.02	1486.
20	8.57	31.76	20	24.67	328.2	0.82	0.08	1481.
30	8.41	32.14	30	25.00	297.8	1.14	0.16	1481.
50	8.14	32.32	50	25.18	281.0	1.71	0.39	1481.
75	7.89	32.63	75	25.46	254.6	2.39	0.82	1481.
100	7.29	33.65	99	26.34	171.1	2.95	1.32	1480.

DEPTH	TEMP	SAL	DEPTH	TEMP	SAL
0.	10.57	30.38	49.	8.14	32.32
1.	10.58	30.40	50.	8.14	32.32
3.	10.56	30.40	51.	8.12	32.32
4.	10.54	30.41	52.	8.11	32.34
6.	10.53	30.42	53.	8.10	32.35
7.	10.51	30.42	56.	8.06	32.36
9.	10.48	30.46	57.	8.05	32.37
10.	10.44	30.54	58.	8.04	32.38
11.	10.28	30.75	59.	8.04	32.38
12.	10.02	30.93	61.	8.03	32.39
13.	9.84	31.35	62.	8.00	32.40
14.	9.54	31.52	63.	8.00	32.41
15.	9.49	31.54	65.	8.00	32.41
16.	9.06	31.62	66.	7.97	32.41
17.	8.76	31.67	67.	7.94	32.43
18.	8.69	31.69	68.	7.94	32.45
19.	8.62	31.71	70.	7.93	32.49
20.	8.57	31.76	72.	7.91	32.56
21.	8.54	31.83	73.	7.90	32.58
23.	8.49	31.90	76.	7.89	32.66
24.	8.48	31.91	78.	7.88	32.74
25.	8.46	31.94	80.	7.88	32.78
26.	8.43	32.03	81.	7.88	32.78
27.	8.41	32.07	82.	7.88	32.80
28.	8.40	32.11	83.	7.88	32.85
29.	8.41	32.11	85.	7.88	32.85
30.	8.41	32.14	86.	7.88	32.90
31.	8.43	32.18	87.	7.84	32.90
32.	8.45	32.18	88.	7.84	32.95
33.	8.48	32.18	89.	7.83	33.01
34.	8.40	32.18	90.	7.83	33.04
35.	8.32	32.18	92.	7.83	33.13
36.	8.27	32.18	93.	7.77	33.20
37.	8.24	32.20	94.	7.76	33.21
38.	8.23	32.22	95.	7.73	33.23
40.	8.22	32.23	96.	7.73	33.28
41.	8.21	32.25	97.	7.69	33.32
42.	8.19	32.25	98.	7.60	33.44
43.	8.19	32.27	99.	7.32	33.56
44.	8.17	32.28	100.	7.29	33.65
45.	8.14	32.29	101.	7.17	33.77
46.	8.14	32.30			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0
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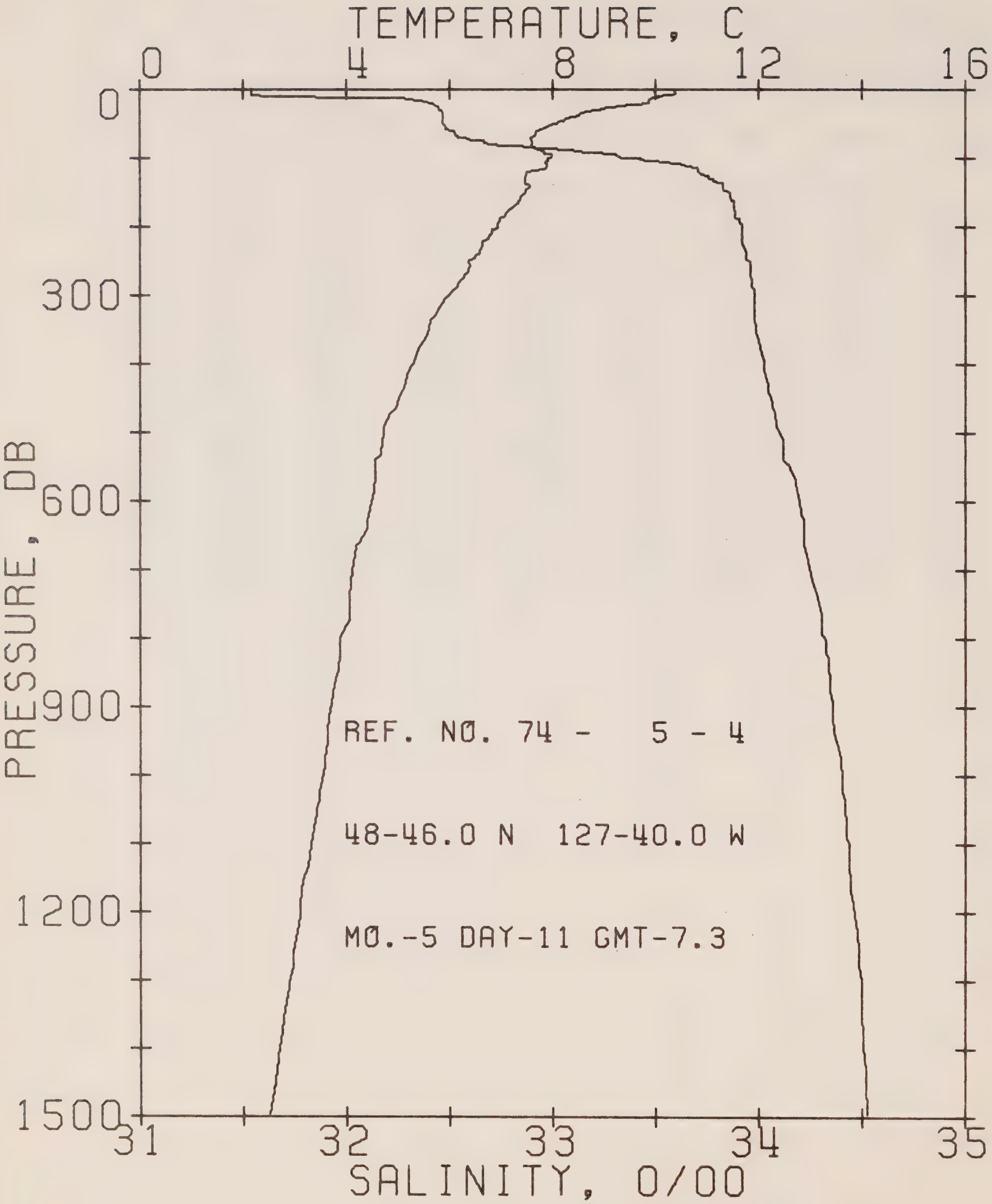
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NØ. 74 - 5 - 3
48-42.0 N 126-40.0 W
MØ.-5 DAY-11 GMT-3.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 3 DATE 11/ 5/74
POSITION 48-42.0N, 126-40.0W GMT 3.5
RESULTS OF STP CAST 272 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	10.49	30.65	0	23.51	439.1	0.0	0.0	1487.
10	10.06	30.85	10	23.73	417.9	0.43	0.02	1485.
20	9.21	31.35	20	24.26	368.0	0.83	0.08	1483.
30	8.41	31.95	30	24.85	312.0	1.16	0.17	1481.
50	8.38	32.34	50	25.16	282.8	1.75	0.41	1482.
75	7.97	32.46	75	25.31	268.5	2.44	0.84	1481.
100	7.96	33.25	99	25.93	210.0	3.05	1.38	1482.
125	7.87	33.64	124	26.25	179.9	3.53	1.93	1483.
150	7.79	33.77	149	26.36	169.8	3.97	2.55	1483.
175	7.32	33.80	174	26.45	161.5	4.38	3.23	1482.
200	7.05	33.90	199	26.57	150.6	4.77	3.98	1481.
225	6.70	33.92	224	26.63	145.3	5.14	4.78	1480.
250	6.46	33.93	248	26.67	141.4	5.50	5.64	1480.
300	5.87	33.95	298	26.77	133.0	6.19	7.57	1478.
400	5.23	34.02	397	26.90	120.9	7.45	12.07	1477.
500	4.76	34.09	496	27.01	111.3	8.61	17.37	1477.
600	4.48	34.18	595	27.11	102.2	9.67	23.33	1478.
800	3.94	34.30	793	27.26	89.6	11.59	37.00	1479.
1000	3.66	34.38	991	27.35	81.6	13.30	52.64	1481.


TEMPERATURE, C
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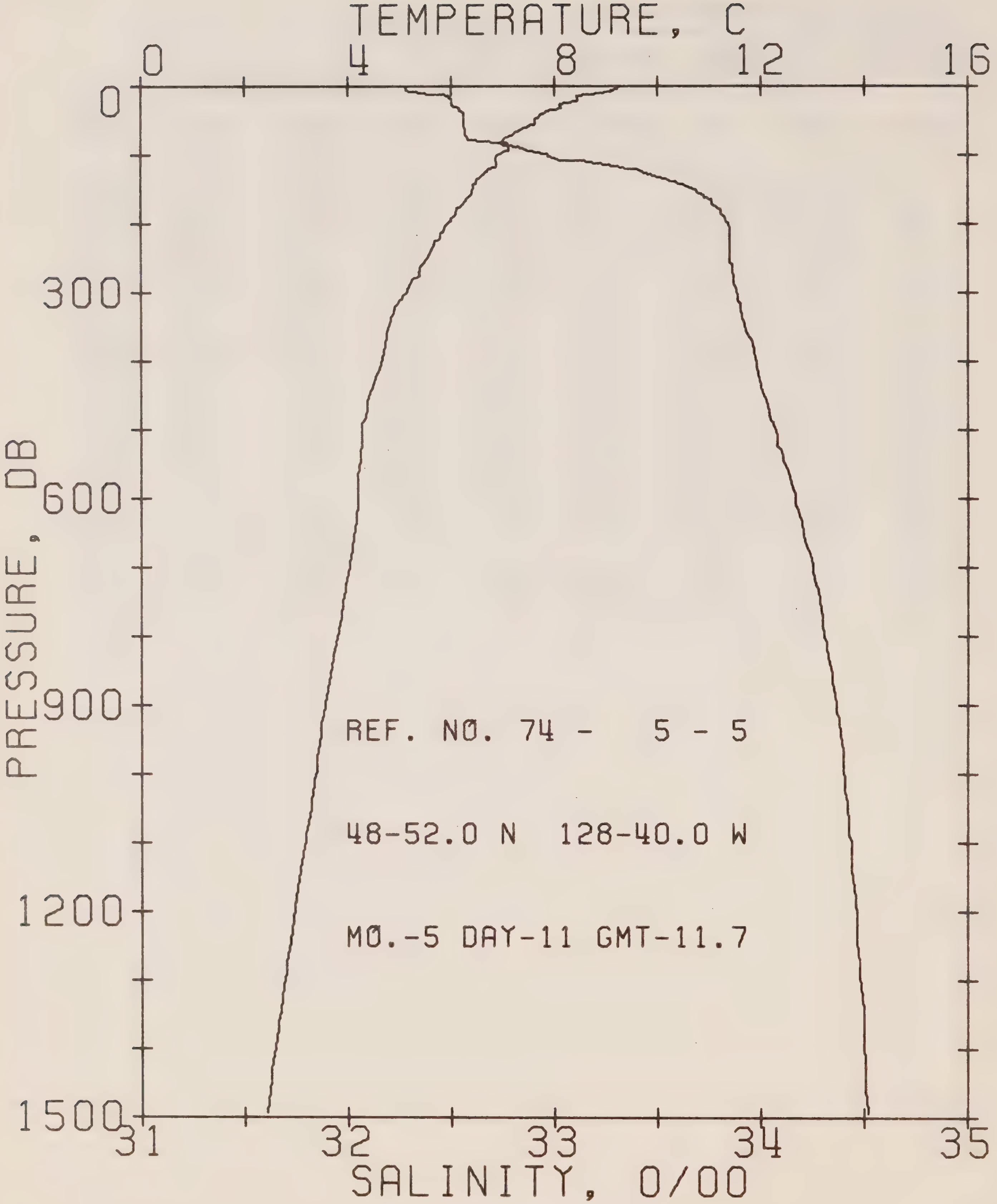
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 74 - 5 - 4
48-46.0 N 127-40.0 W
MO.-5 DAY-11 GMT-7.3
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 4 DATE 11/ 5/74
POSITION 48-46.0N, 127-40.0W GMT 7.3
RESULTS OF STP CAST 253 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	10.37	31.54	0	24.22	371.2	0.0	0.0	1487.
10	10.06	31.81	10	24.48	346.7	0.37	0.02	1487.
20	9.78	32.42	20	25.00	297.3	0.68	0.07	1487.
30	8.83	32.46	30	25.18	280.1	0.97	0.14	1483.
50	8.01	32.47	50	25.31	268.0	1.51	0.36	1480.
75	7.60	32.67	75	25.53	247.8	2.16	0.77	1480.
100	7.93	33.43	99	26.08	196.3	2.72	1.27	1482.
125	7.46	33.75	124	26.39	166.3	3.17	1.78	1481.
150	7.47	33.86	149	26.48	158.7	3.58	2.35	1482.
175	7.15	33.88	174	26.54	153.2	3.97	3.00	1481.
200	6.93	33.92	199	26.60	147.6	4.34	3.71	1481.
225	6.63	33.92	223	26.64	144.0	4.71	4.50	1480.
250	6.37	33.96	248	26.71	138.0	5.06	5.36	1479.
300	5.97	33.98	298	26.78	132.0	5.74	7.27	1478.
400	5.27	34.03	397	26.90	121.0	7.01	11.78	1477.
500	4.73	34.10	496	27.02	110.1	8.17	17.09	1477.
600	4.49	34.20	595	27.12	101.2	9.22	23.00	1478.
800	3.87	34.32	793	27.29	86.6	11.11	36.38	1478.
1000	3.53	34.41	991	27.39	78.0	12.76	51.53	1480.
1200	3.09	34.47	1188	27.48	70.1	14.24	68.13	1482.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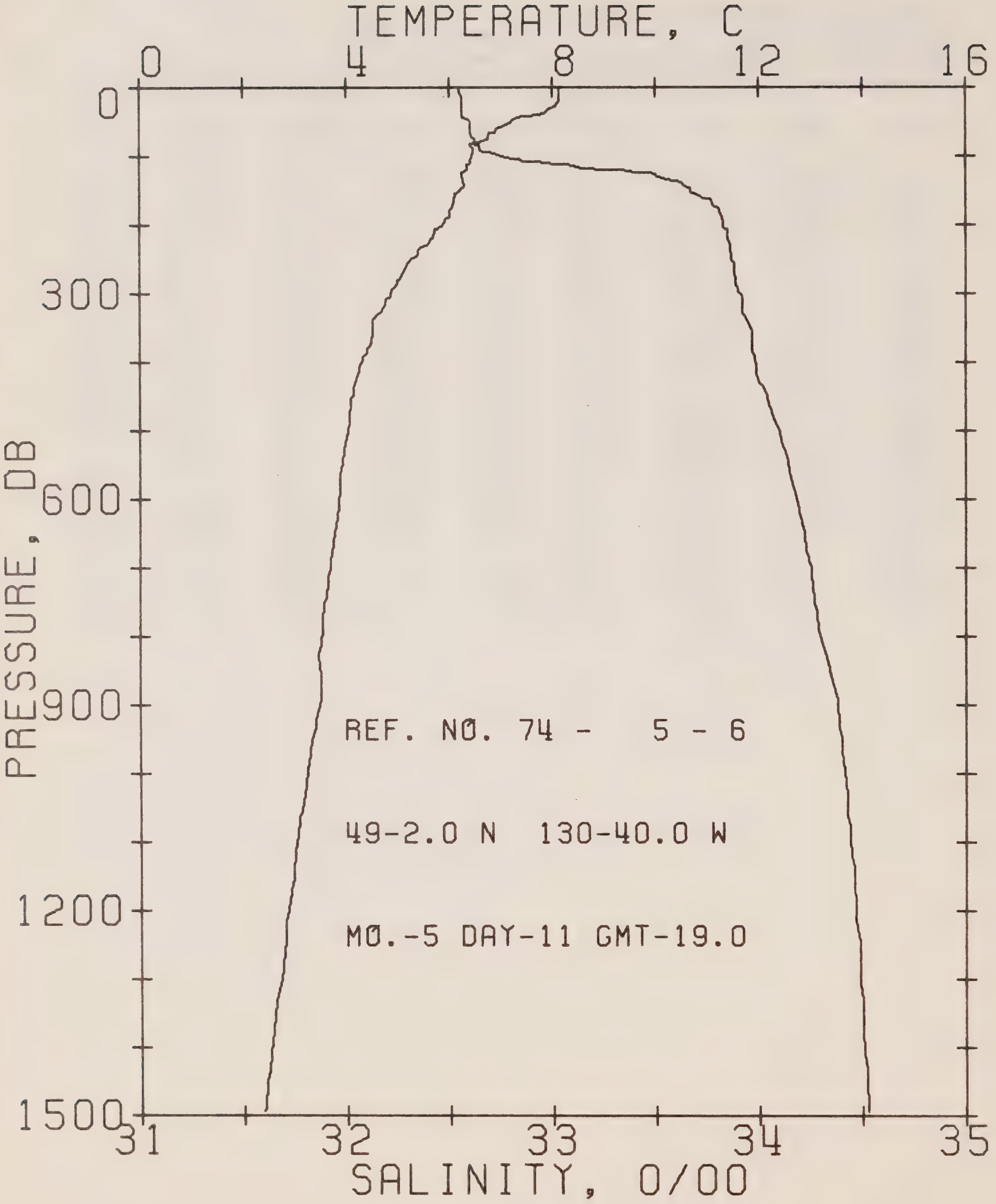
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 74 - 5 - 5
48-52.0 N 128-40.0 W
MO.-5 DAY-11 GMT-11.7
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 5 DATE 11/ 5/74
POSITION 48-52.0N. 128-40.0W GMT 11.7
RESULTS OF STP CAST 248 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	9.23	32.28	0	24.98	298.7	0.0	0.0	1484.
10	8.84	32.36	10	25.10	287.4	0.30	0.01	1483.
20	8.45	32.50	20	25.27	271.5	0.57	0.06	1482.
30	8.12	32.53	30	25.34	264.7	0.84	0.13	1481.
50	7.63	32.56	50	25.44	256.1	1.36	0.34	1479.
75	7.07	32.58	75	25.53	247.7	1.99	0.74	1477.
100	6.89	32.97	99	25.86	216.5	2.57	1.25	1478.
125	6.65	33.44	124	26.26	178.7	3.06	1.82	1478.
150	6.40	33.68	149	26.48	157.9	3.48	2.40	1477.
175	6.17	33.79	174	26.60	147.1	3.86	3.04	1477.
200	5.93	33.84	199	26.67	140.8	4.22	3.72	1477.
225	5.71	33.85	223	26.70	137.7	4.57	4.47	1476.
250	5.51	33.85	248	26.73	135.5	4.91	5.30	1476.
300	5.11	33.88	298	26.80	128.8	5.57	7.15	1475.
400	4.65	33.98	397	26.93	117.5	6.80	11.52	1475.
500	4.26	34.07	496	27.04	107.3	7.92	16.68	1475.
600	4.18	34.17	595	27.13	99.8	8.96	22.48	1476.
800	3.78	34.31	793	27.28	86.7	10.82	35.70	1478.
1000	3.36	34.40	991	27.40	76.4	12.43	50.47	1480.
1200	2.95	34.47	1188	27.49	68.4	13.88	66.68	1481.


TEMPERATURE, C
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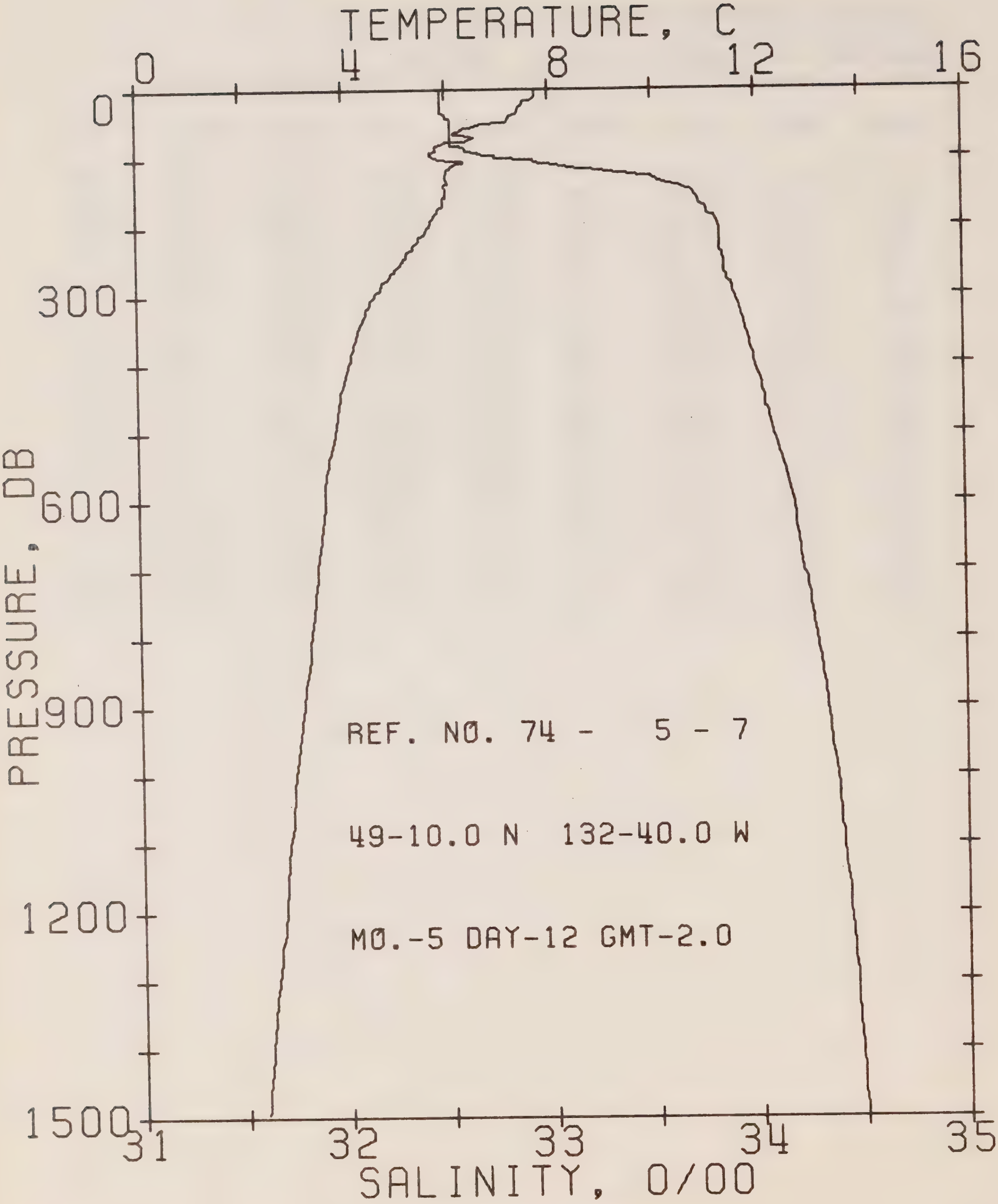
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 74 - 5 - 6
49-2.0 N 130-40.0 W
MO.-5 DAY-11 GMT-19.0
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 6 DATE 11/ 5/74
POSITION 49- 2.0N, 130-40.0W GMT 19.0
RESULTS OF STP CAST 230 POINTS TAKEN FROM ANALOG TRACE

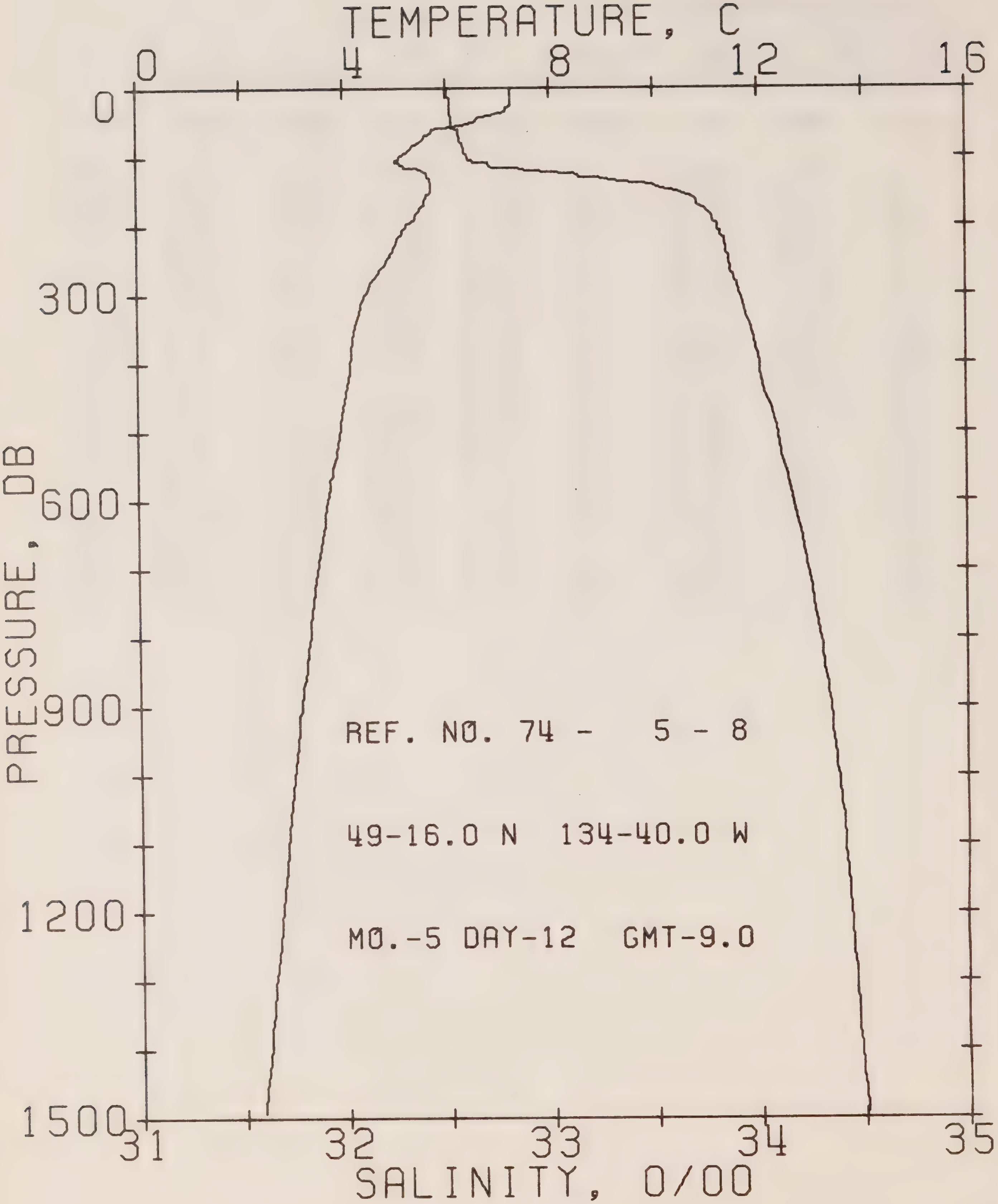
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.13	32.55	0	25.36	262.7	0.0	0.0	1480.
10	8.13	32.55	10	25.36	262.9	0.26	0.01	1480.
20	8.11	32.56	20	25.37	262.2	0.53	0.05	1480.
30	7.98	32.56	30	25.39	260.5	0.79	0.12	1480.
50	7.19	32.60	50	25.53	247.2	1.30	0.33	1477.
75	6.74	32.62	75	25.61	240.3	1.91	0.71	1476.
100	6.42	32.75	99	25.75	226.9	2.49	1.24	1475.
125	6.25	33.50	124	26.36	169.2	3.00	1.81	1476.
150	6.21	33.67	149	26.50	156.3	3.40	2.38	1477.
175	6.03	33.80	174	26.63	144.6	3.78	3.00	1476.
200	5.86	33.83	199	26.67	140.6	4.13	3.68	1476.
225	5.60	33.85	223	26.72	135.9	4.48	4.43	1476.
250	5.24	33.87	248	26.78	130.9	4.81	5.24	1475.
300	4.86	33.90	298	26.85	124.4	5.45	7.02	1474.
400	4.30	33.98	397	26.97	113.2	6.63	11.22	1473.
500	4.03	34.10	496	27.09	102.6	7.71	16.16	1474.
600	3.85	34.19	595	27.18	95.0	8.69	21.69	1475.
800	3.51	34.30	793	27.30	84.5	10.48	34.41	1477.
1000	3.22	34.42	990	27.42	73.9	12.06	48.81	1479.
1200	2.85	34.47	1188	27.50	67.0	13.46	64.55	1481.



TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NØ. 74 - 5 - 7
49-10.0 N 132-40.0 W
MØ.-5 DAY-12 GMT-2.0
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 7 DATE 12/ 5/74
POSITION 49-10.0N. 132-40.0W GMT 2.0
RESULTS OF STP CAST 231 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.77	32.48	0	25.35	262.9	0.0	0.0	1479.
10	7.77	32.48	10	25.35	263.3	0.26	0.01	1479.
20	7.49	32.48	20	25.39	259.8	0.52	0.05	1478.
30	7.41	32.48	30	25.41	258.8	0.78	0.12	1478.
50	6.72	32.53	50	25.54	246.5	1.29	0.33	1476.
75	6.37	32.53	75	25.58	242.5	1.90	0.71	1475.
100	5.79	32.74	99	25.82	220.2	2.47	1.22	1473.
125	6.00	33.46	124	26.36	169.1	2.97	1.78	1475.
150	6.00	33.70	149	26.55	151.4	3.36	2.34	1476.
175	5.85	33.77	174	26.62	144.7	3.74	2.96	1476.
200	5.66	33.82	199	26.69	138.7	4.09	3.63	1475.
225	5.40	33.83	223	26.73	135.5	4.43	4.38	1475.
250	5.17	33.85	248	26.77	131.6	4.77	5.18	1474.
300	4.62	33.89	298	26.87	122.5	5.40	6.96	1473.
400	4.09	33.99	397	27.00	110.3	6.56	11.07	1472.
500	3.82	34.08	496	27.10	101.8	7.61	15.91	1473.
600	3.60	34.18	595	27.20	93.0	8.58	21.33	1474.
800	3.30	34.29	793	27.31	83.1	10.35	33.90	1476.
1000	2.96	34.37	990	27.41	74.1	11.92	48.31	1478.
1200	2.74	34.43	1188	27.48	68.7	13.35	64.29	1480.



TEMPERATURE, C
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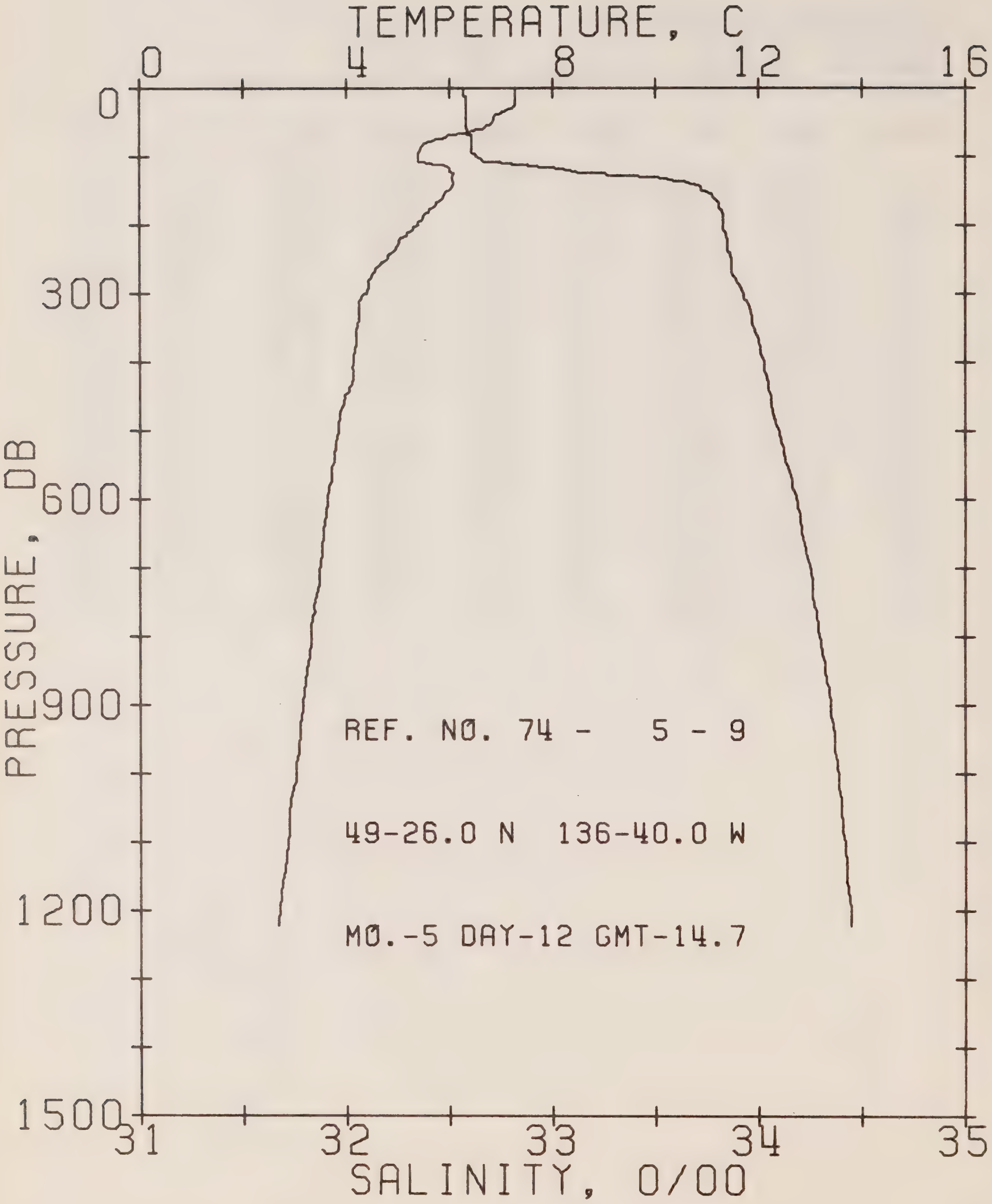
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 74 - 5 - 8
49-16.0 N 134-40.0 W
MO.-5 DAY-12 GMT-9.0
31
32
33
34
35
SALINITY, 0/00

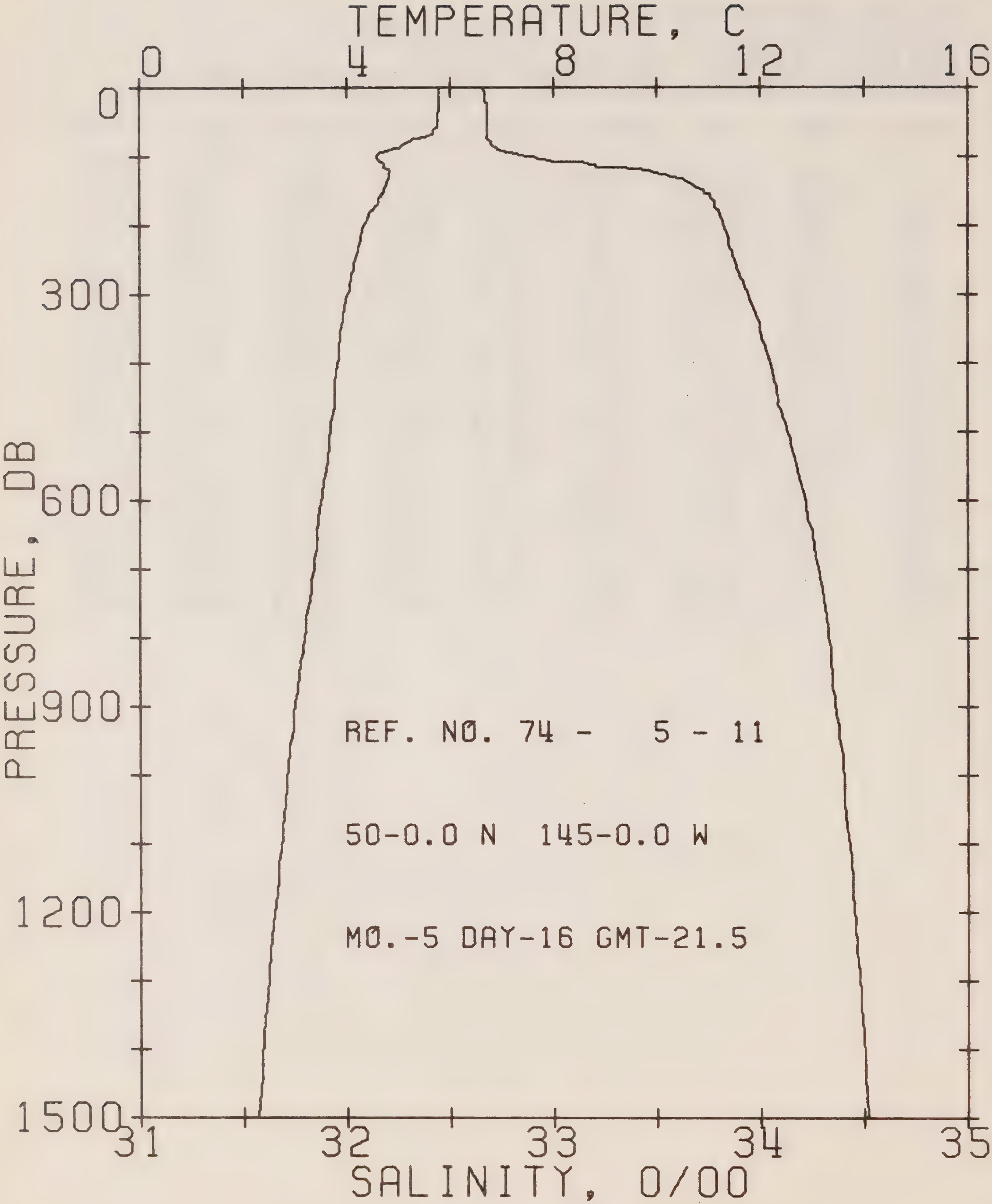
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 8 DATE 12/ 5/74
POSITION 49-16.0N. 134-40.0W GMT 9.0
RESULTS OF STP CAST 210 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.26	32.51	0	25.45	254.0	0.0	0.0	1477.
10	7.26	32.51	10	25.45	254.3	0.25	0.01	1477.
20	7.26	32.52	20	25.46	253.7	0.51	0.05	1477.
30	7.16	32.52	30	25.47	252.5	0.76	0.12	1477.
50	6.49	32.53	50	25.57	243.6	1.26	0.32	1475.
75	5.53	32.57	75	25.72	229.6	1.84	0.69	1471.
100	5.09	32.60	99	25.79	222.6	2.41	1.19	1470.
125	5.63	33.12	124	26.14	189.8	2.94	1.80	1473.
150	5.72	33.62	149	26.52	154.0	3.37	2.40	1475.
175	5.48	33.74	174	26.65	142.3	3.74	3.01	1474.
200	5.21	33.81	199	26.73	134.5	4.08	3.67	1474.
225	5.00	33.84	223	26.78	130.1	4.41	4.39	1473.
250	4.83	33.86	248	26.82	126.9	4.73	5.16	1473.
300	4.40	33.91	298	26.90	118.8	5.35	6.88	1472.
400	4.11	34.01	397	27.01	109.3	6.48	10.92	1473.
500	3.92	34.09	496	27.10	101.7	7.54	15.78	1473.
600	3.66	34.17	595	27.18	94.4	8.52	21.27	1474.
800	3.29	34.29	793	27.32	82.3	10.28	33.78	1476.
1000	2.97	34.38	990	27.42	73.9	11.84	48.04	1478.
1200	2.71	34.44	1188	27.49	67.9	13.26	63.90	1480.


TEMPERATURE, C
0
4
8
12
16
PRESSURE, DB
0
300
600
900
1200
1500
REF. NØ. 74 - 5 - 9
49-26.0 N 136-40.0 W
MØ.-5 DAY-12 GMT-14.7
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 9 DATE 12/ 5/74
POSITION 49-26.0N, 136-40.0W GMT 14.7
RESULTS OF STP CAST 201 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.28	32.57	0	25.49	249.8	0.0	0.0	1477.
10	7.28	32.57	10	25.49	250.1	0.25	0.01	1477.
20	7.28	32.58	20	25.50	249.5	0.50	0.05	1477.
30	7.15	32.58	30	25.52	248.0	0.75	0.11	1477.
50	6.82	32.58	50	25.56	244.0	1.24	0.31	1476.
75	5.73	32.61	75	25.72	229.0	1.83	0.69	1472.
100	5.38	32.63	99	25.78	223.7	2.40	1.19	1471.
125	6.06	33.25	124	26.19	185.2	2.92	1.79	1475.
150	5.96	33.73	149	26.58	148.7	3.32	2.35	1476.
175	5.65	33.81	174	26.68	139.3	3.68	2.94	1475.
200	5.35	33.83	199	26.73	134.6	4.02	3.60	1474.
225	5.00	33.85	223	26.79	129.4	4.35	4.31	1473.
250	4.77	33.87	248	26.83	125.7	4.67	5.08	1473.
300	4.35	33.92	298	26.92	117.3	5.28	6.79	1472.
400	4.13	34.03	397	27.03	107.9	6.40	10.78	1473.
500	3.83	34.10	496	27.11	100.6	7.45	15.58	1473.
600	3.63	34.18	595	27.20	92.8	8.42	21.01	1474.
800	3.30	34.30	793	27.32	82.4	10.16	33.44	1476.
1000	3.01	34.39	990	27.42	73.8	11.72	47.68	1478.
1200	2.70	34.45	1188	27.50	66.8	13.13	63.43	1480.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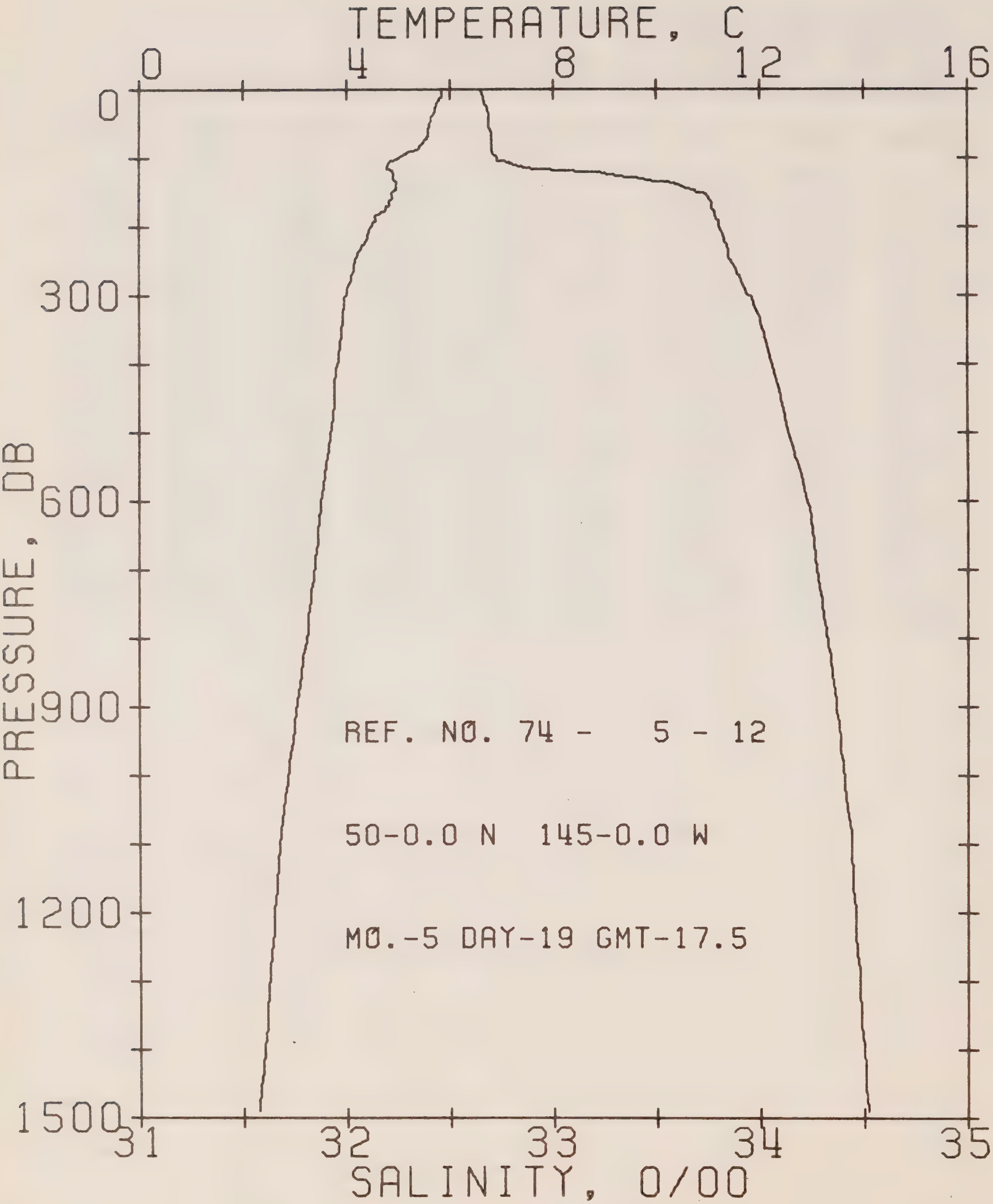
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 74 - 5 - 11
50-0.0 N 145-0.0 W
MO.-5 DAY-16 GMT-21.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 11 DATE 16/ 5/74
POSITION 50- 0.0N, 145- 0.0W GMT 21.5
RESULTS OF STP CAST 185 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.78	32.66	0	25.76	224.7	0.0	0.0	1471.
10	5.78	32.67	10	25.77	224.3	0.22	0.01	1471.
20	5.78	32.67	20	25.77	224.4	0.45	0.05	1471.
30	5.78	32.68	30	25.77	223.7	0.67	0.10	1472.
50	5.76	32.68	50	25.78	223.7	1.12	0.29	1472.
75	5.25	32.69	75	25.84	217.5	1.68	0.64	1470.
100	4.60	32.88	99	26.07	196.5	2.20	1.11	1468.
125	4.82	33.54	124	26.56	149.5	2.63	1.60	1470.
150	4.71	33.72	149	26.72	134.7	2.99	2.09	1471.
175	4.52	33.79	174	26.79	128.3	3.31	2.64	1470.
200	4.32	33.82	199	26.84	123.7	3.63	3.24	1470.
225	4.25	33.85	223	26.87	121.2	3.93	3.90	1470.
250	4.15	33.87	248	26.90	118.5	4.23	4.62	1470.
300	4.01	33.94	298	26.97	112.3	4.81	6.24	1470.
400	3.81	34.05	397	27.07	103.2	5.89	10.07	1471.
500	3.67	34.13	496	27.15	96.2	6.88	14.64	1472.
600	3.50	34.22	595	27.24	88.8	7.81	19.83	1473.
800	3.17	34.33	793	27.36	78.3	9.48	31.66	1476.
1000	2.84	34.41	990	27.45	70.5	10.96	45.28	1478.
1200	2.59	34.46	1188	27.51	65.2	12.32	60.49	1480.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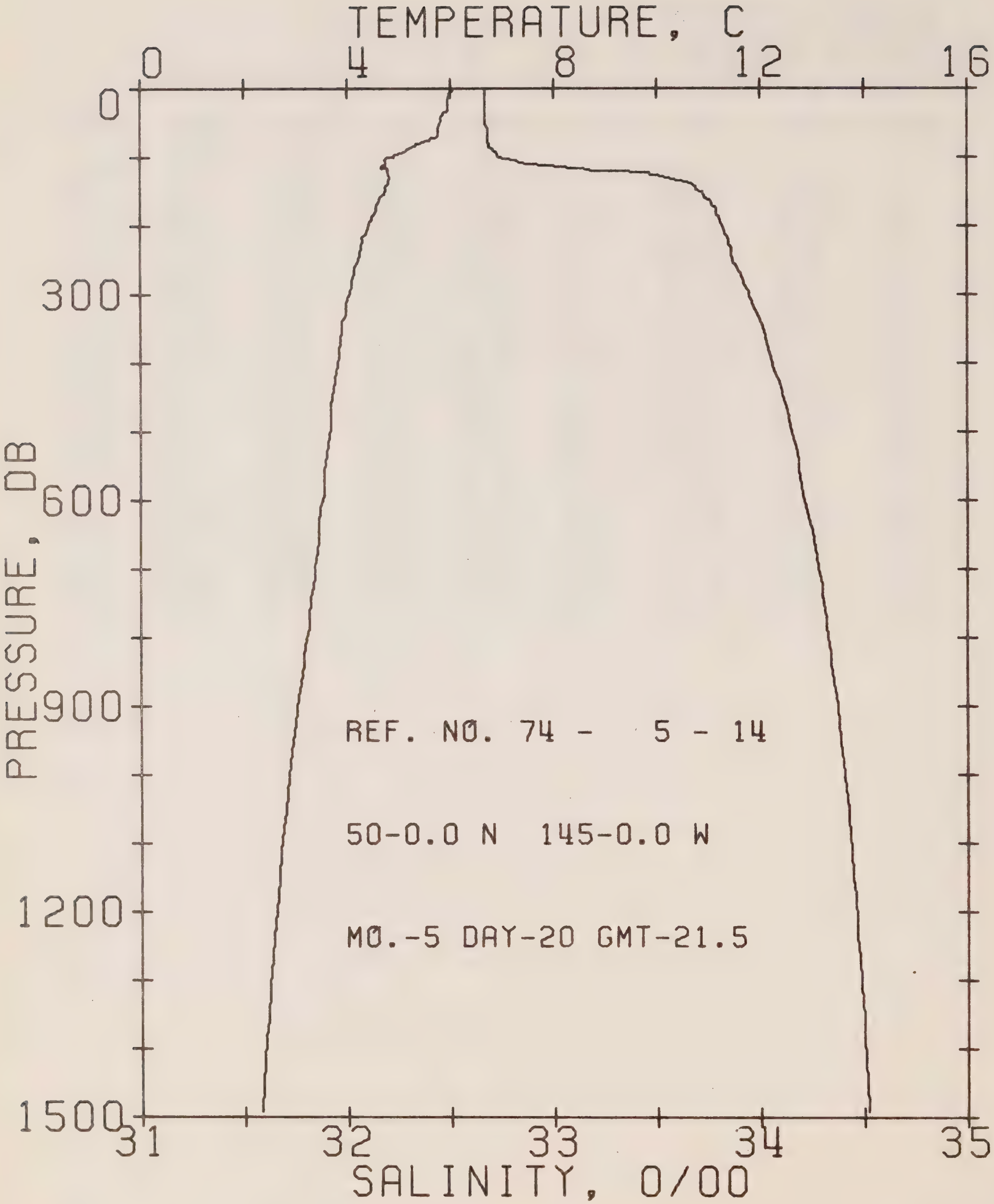
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 74 - 5 - 12
50-0.0 N 145-0.0 W
MO.-5 DAY-19 GMT-17.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 12 DATE 19/ 5/74
POSITION 50- 0.0N, 145- 0.0W GMT 17.5
RESULTS OF STP CAST 181 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	5.85	32.65	0	25.74	226.2	0.0	0.0	1471.
10	5.85	32.66	10	25.75	225.9	0.23	0.01	1472.
20	5.74	32.67	20	25.77	223.9	0.45	0.05	1471.
30	5.71	32.68	30	25.78	222.9	0.67	0.10	1471.
50	5.61	32.69	50	25.80	221.2	1.12	0.28	1471.
75	5.49	32.70	75	25.82	219.4	1.67	0.63	1471.
100	4.99	32.73	99	25.90	211.8	2.21	1.12	1470.
125	4.90	33.30	124	26.36	168.4	2.70	1.68	1470.
150	4.87	33.71	149	26.69	137.7	3.07	2.20	1471.
175	4.73	33.77	174	26.76	131.5	3.41	2.75	1471.
200	4.46	33.80	199	26.81	126.9	3.73	3.36	1470.
225	4.31	33.84	223	26.86	122.5	4.04	4.04	1470.
250	4.15	33.86	248	26.89	119.6	4.34	4.77	1470.
300	3.98	33.95	298	26.98	111.8	4.92	6.40	1470.
400	3.82	34.06	397	27.08	102.5	5.99	10.18	1471.
500	3.68	34.14	496	27.16	96.0	6.98	14.72	1473.
600	3.50	34.23	595	27.25	88.1	7.90	19.86	1474.
800	3.22	34.32	793	27.35	79.3	9.57	31.77	1476.
1000	2.87	34.41	990	27.45	70.7	11.06	45.45	1478.
1200	2.60	34.46	1188	27.51	65.0	12.41	60.54	1480.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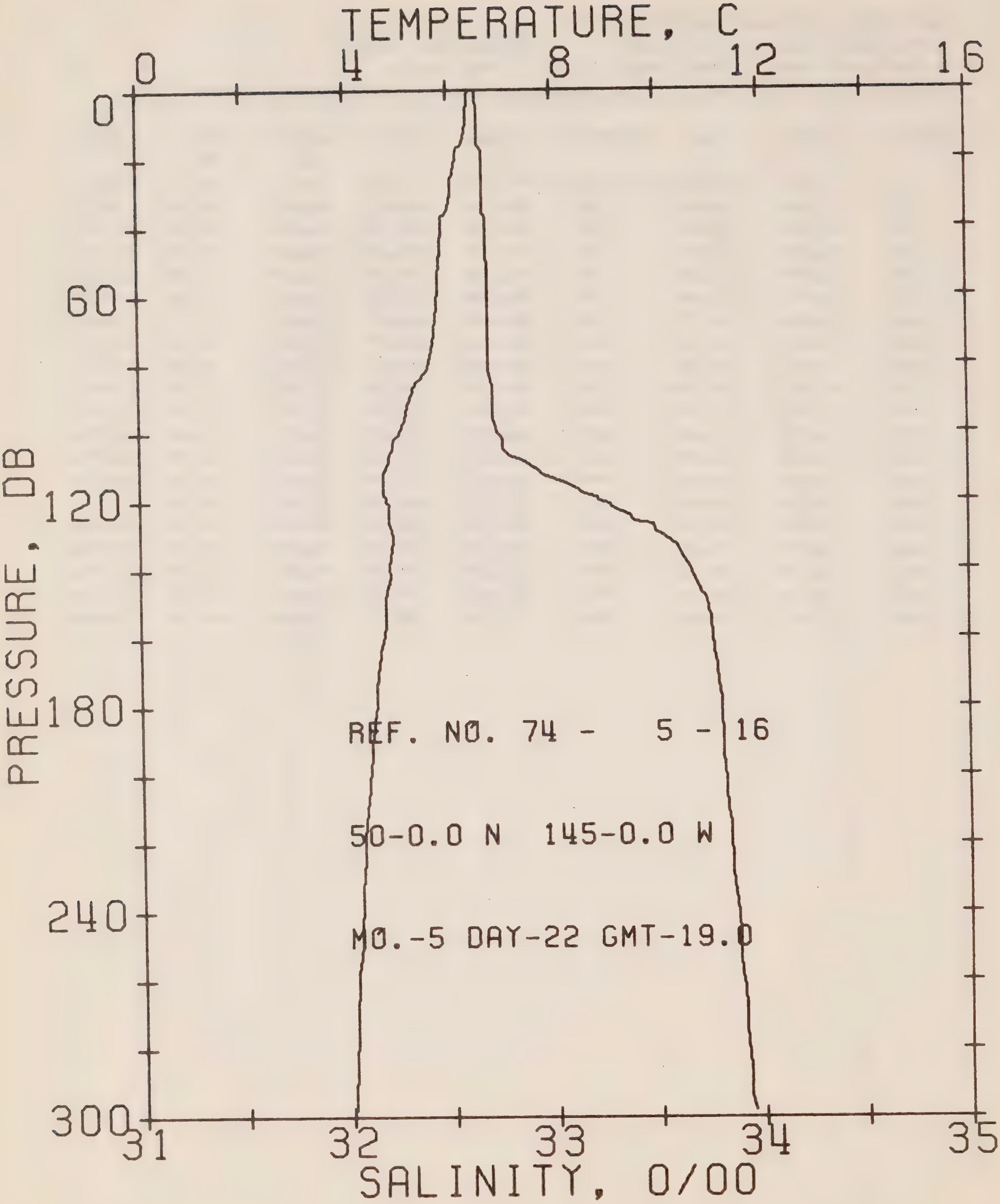
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 74 - 5 - 14
50-0.0 N 145-0.0 W
MO.-5 DAY-20 GMT-21.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 14 DATE 20/ 5/74
POSITION 50- 0.0N. 145- 0.0W GMT 21.5
RESULTS OF STP CAST 161 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.05	32.67	0	25.73	227.0	0.0	0.0	1472.
10	5.96	32.67	10	25.74	226.4	0.23	0.01	1472.
20	5.95	32.67	20	25.74	226.4	0.45	0.05	1472.
30	5.94	32.67	30	25.75	226.3	0.68	0.10	1472.
50	5.79	32.67	50	25.76	224.8	1.13	0.29	1472.
75	5.59	32.68	75	25.80	222.0	1.69	0.64	1472.
100	4.88	32.74	99	25.92	209.9	2.23	1.12	1469.
125	4.81	33.47	124	26.51	154.7	2.70	1.66	1470.
150	4.71	33.72	149	26.72	135.1	3.05	2.16	1471.
175	4.57	33.79	174	26.79	128.6	3.38	2.70	1470.
200	4.41	33.82	199	26.83	125.0	3.70	3.31	1470.
225	4.28	33.85	223	26.87	121.5	4.01	3.98	1470.
250	4.20	33.87	248	26.89	119.6	4.31	4.71	1470.
300	4.02	33.95	298	26.97	111.9	4.89	6.32	1470.
400	3.82	34.06	397	27.08	102.5	5.95	10.12	1471.
500	3.66	34.16	496	27.17	94.4	6.93	14.60	1472.
600	3.51	34.21	595	27.24	89.2	7.85	19.72	1474.
800	3.19	34.33	793	27.36	78.5	9.52	31.60	1476.
1000	2.86	34.41	990	27.45	70.5	11.01	45.25	1478.
1200	2.61	34.47	1188	27.52	64.7	12.36	60.35	1480.


TEMPERATURE, C
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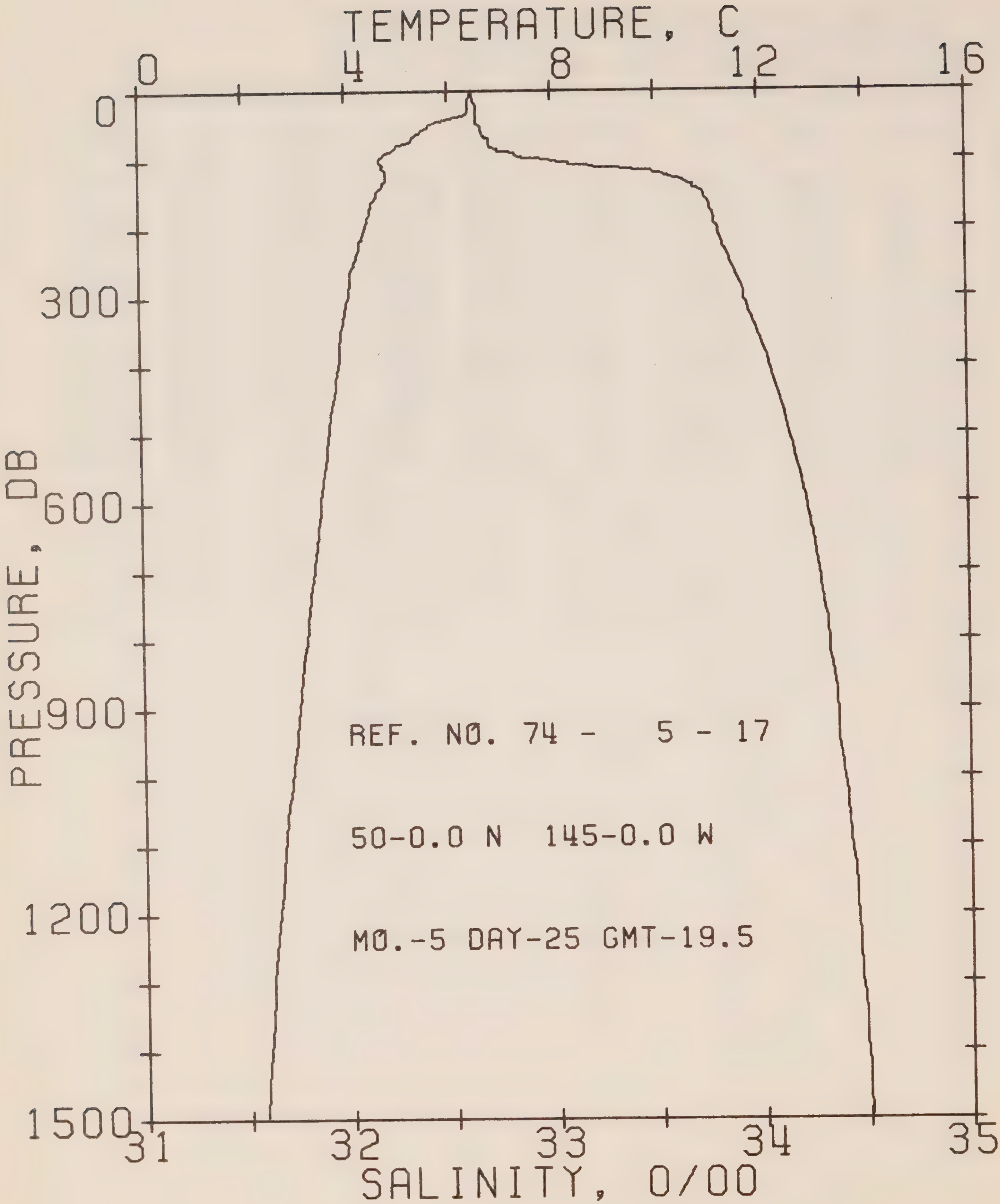
8
12
16
0
60
120
180
240
300
PRESSURE, DB
REF. NO. 74 - 5 - 16
50-0.0 N 145-0.0 W
MO.-5 DAY-22 GMT-19.0
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 16 DATE 22/ 5/74
POSITION 50- 0.0N, 145- 0.0W GMT 19.0
RESULTS OF STP CAST 101 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.42	32.64	0	25.66	233.7	0.0	0.0	1474.
10	6.36	32.65	10	25.68	232.5	0.23	0.01	1474.
20	6.16	32.67	20	25.72	228.8	0.46	0.05	1473.
30	6.04	32.67	30	25.73	227.5	0.69	0.11	1473.
50	5.81	32.68	50	25.77	223.9	1.14	0.29	1472.
75	5.67	32.69	75	25.79	222.2	1.70	0.64	1472.
100	5.01	32.73	99	25.90	212.1	2.24	1.13	1470.
125	4.81	33.37	124	26.43	161.8	2.72	1.67	1470.
150	4.72	33.74	149	26.73	134.0	3.08	2.17	1471.
175	4.54	33.79	174	26.80	128.0	3.41	2.72	1470.
200	4.37	33.82	199	26.83	124.7	3.72	3.32	1470.
225	4.26	33.85	223	26.87	121.2	4.03	3.98	1470.
250	4.17	33.88	248	26.90	118.4	4.33	4.71	1470.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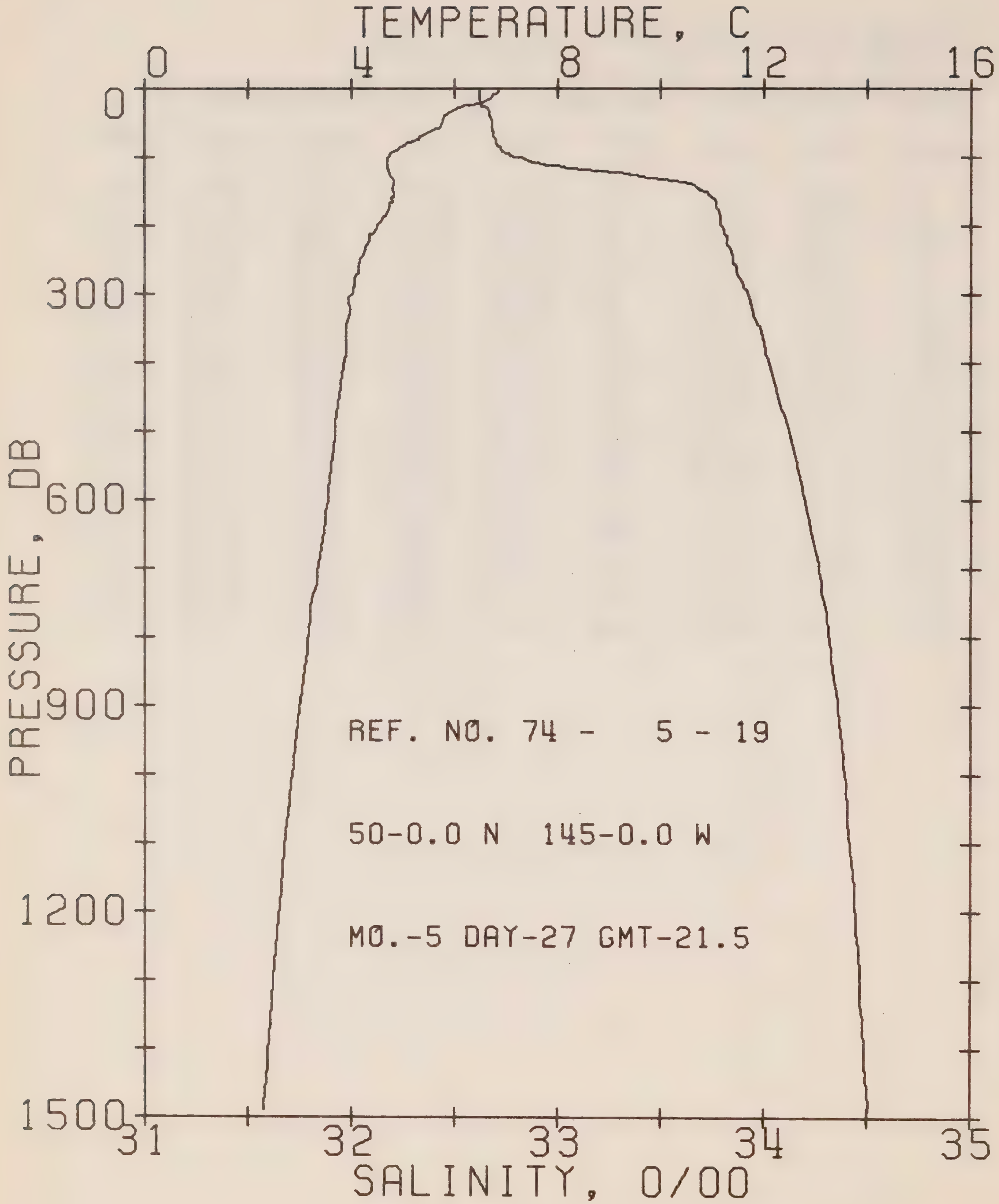
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 74 - 5 - 17
50-0.0 N 145-0.0 W
MO.-5 DAY-25 GMT-19.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 17 DATE 25/ 5/74
POSITION 50- 0.0N, 145- 0.0W GMT 19.5
RESULTS OF STP CAST 171 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.47	32.62	0	25.64	235.8	0.0	0.0	1474.
10	6.42	32.62	10	25.65	235.3	0.24	0.01	1474.
20	6.41	32.64	20	25.66	234.0	0.47	0.05	1474.
30	6.39	32.64	30	25.67	234.0	0.70	0.11	1474.
50	5.63	32.66	50	25.78	223.7	1.16	0.29	1471.
75	5.20	32.70	75	25.86	216.1	1.71	0.64	1470.
100	4.67	32.98	99	26.14	189.7	2.23	1.10	1469.
125	4.80	33.57	124	26.59	147.1	2.65	1.58	1470.
150	4.62	33.74	149	26.74	133.0	2.99	2.06	1470.
175	4.47	33.77	174	26.79	128.7	3.32	2.60	1470.
200	4.37	33.81	199	26.83	125.2	3.64	3.21	1470.
225	4.27	33.83	223	26.85	122.9	3.95	3.88	1470.
250	4.16	33.86	248	26.89	119.5	4.25	4.62	1470.
300	4.03	33.93	298	26.96	113.6	4.83	6.24	1470.
400	3.85	34.05	397	27.07	103.5	5.91	10.10	1471.
500	3.64	34.14	496	27.17	95.0	6.90	14.63	1472.
600	3.47	34.22	595	27.25	88.0	7.82	19.75	1473.
800	3.17	34.33	793	27.36	78.5	9.48	31.55	1476.
1000	2.85	34.40	990	27.44	71.3	10.97	45.27	1478.
1200	2.58	34.45	1188	27.51	65.3	12.34	60.50	1480.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8
12
16
PRESSURE, DB
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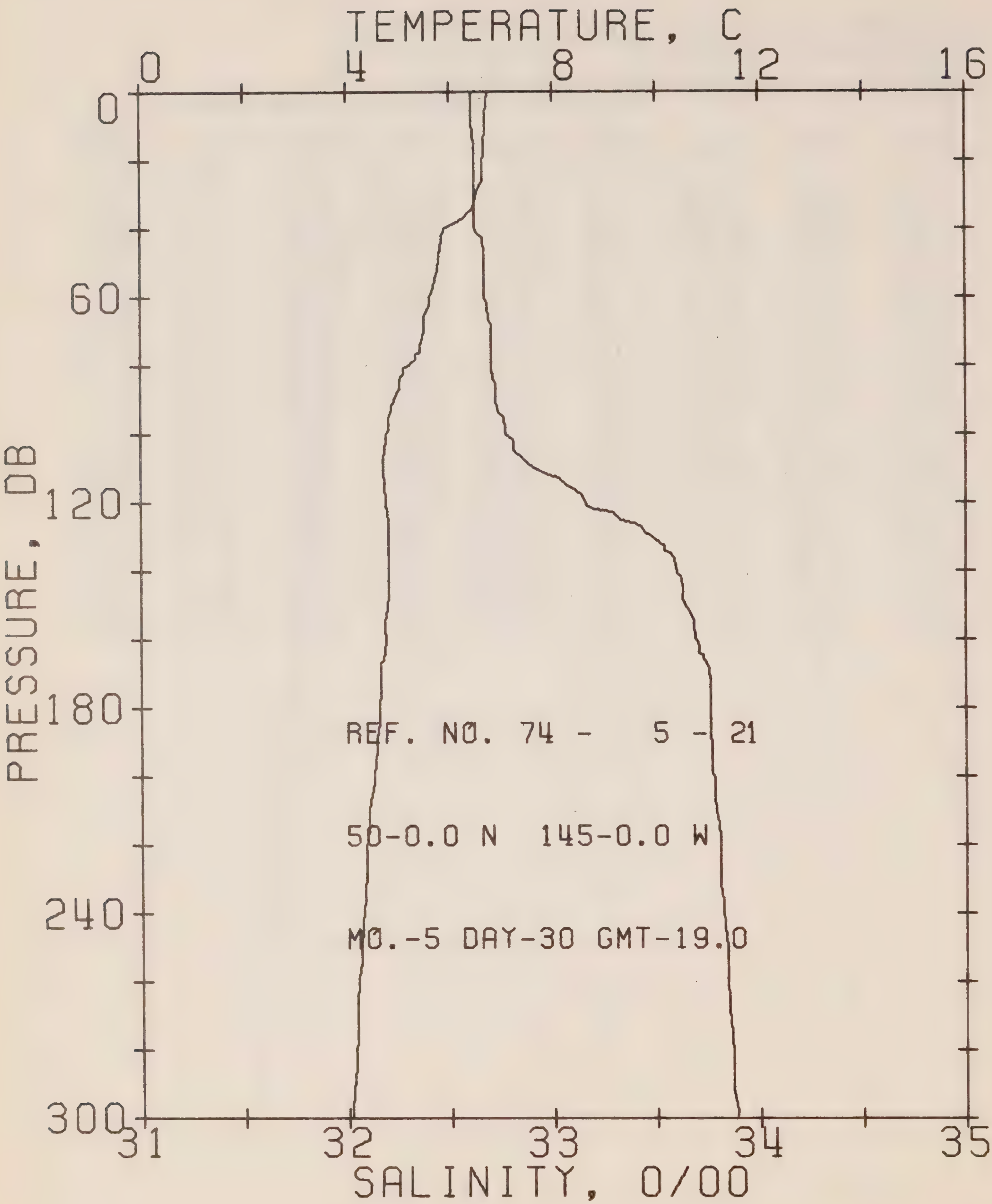
300
600
900
1200
1500
REF. NO. 74 - 5 - 19
50-0.0 N 145-0.0 W
MO.-5 DAY-27 GMT-21.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 19 DATE 27/ 5/74
POSITION 50- 0.0N, 145- 0.0W GMT 21.5
RESULTS OF STP CAST 182 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.86	32.62	0	25.59	240.6	0.0	0.0	1475.
10	6.76	32.62	10	25.60	239.7	0.24	0.01	1475.
20	6.54	32.63	20	25.64	236.4	0.48	0.05	1474.
30	6.00	32.66	30	25.73	227.8	0.71	0.11	1472.
50	5.74	32.68	50	25.78	223.5	1.16	0.29	1472.
75	5.22	32.70	75	25.85	216.4	1.71	0.64	1470.
100	4.69	32.80	99	25.99	203.5	2.24	1.11	1468.
125	4.76	33.35	124	26.42	163.1	2.70	1.64	1470.
150	4.82	33.71	149	26.70	137.1	3.07	2.15	1471.
175	4.71	33.77	174	26.76	131.3	3.40	2.71	1471.
200	4.48	33.80	199	26.80	127.3	3.73	3.32	1471.
225	4.30	33.82	223	26.84	124.0	4.04	4.00	1470.
250	4.16	33.85	248	26.88	120.4	4.35	4.74	1470.
300	4.00	33.92	298	26.95	113.8	4.93	6.38	1470.
400	3.85	34.03	397	27.05	105.1	6.03	10.28	1471.
500	3.67	34.12	496	27.15	96.9	7.04	14.91	1472.
600	3.54	34.20	595	27.22	90.7	7.98	20.16	1474.
800	3.16	34.32	793	27.35	79.2	9.66	32.16	1475.
1000	2.85	34.40	990	27.44	71.3	11.16	45.90	1478.
1200	2.60	34.45	1188	27.50	66.1	12.54	61.27	1480.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12
16
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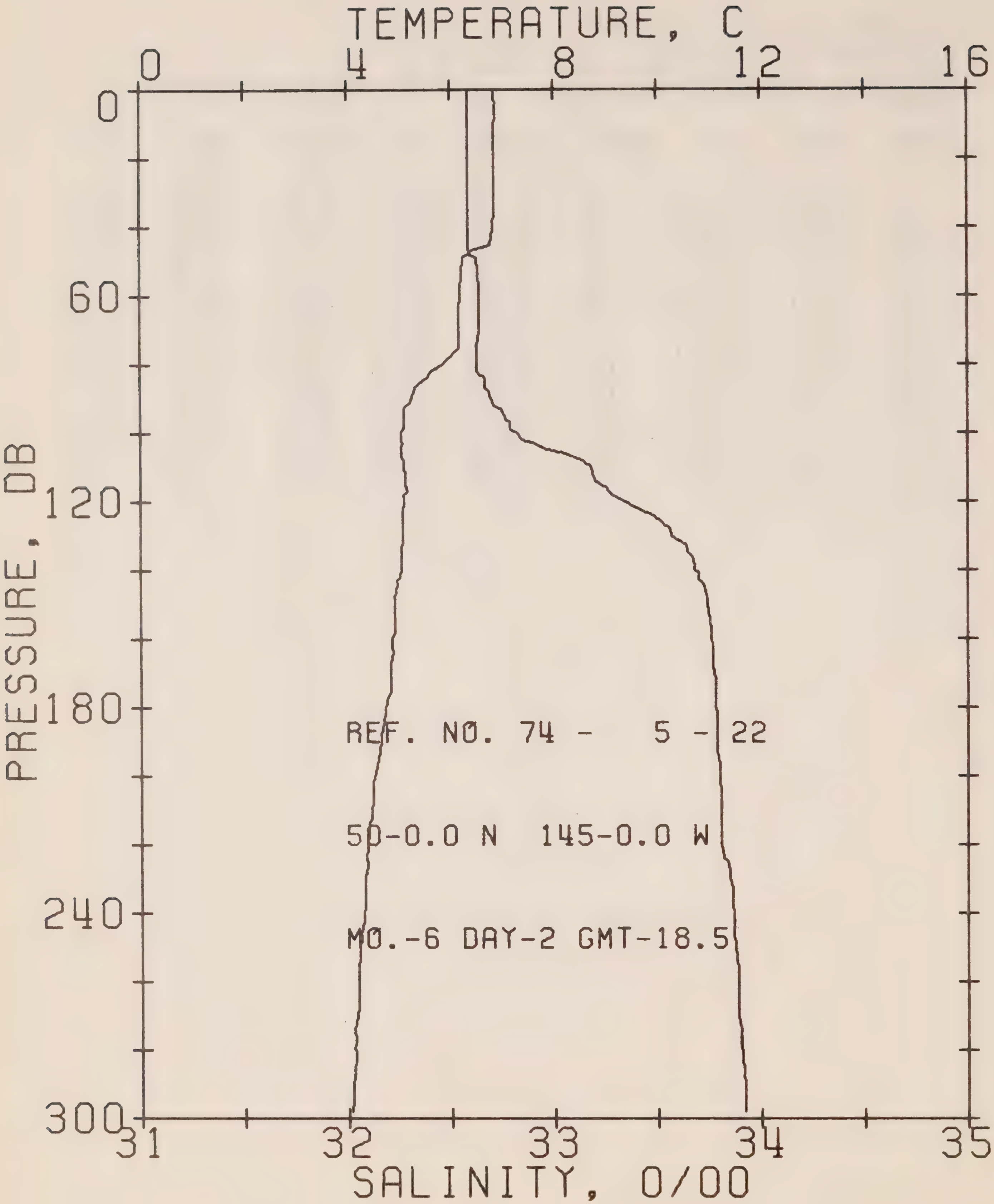
60
120
180
240
300
PRESSURE, DB
REF. NO. 74 - 5 - 21
50-0.0 N 145-0.0 W
MO.-5 DAY-30 GMT-19.0
31
32
33
34
35
SALINITY, 0/00

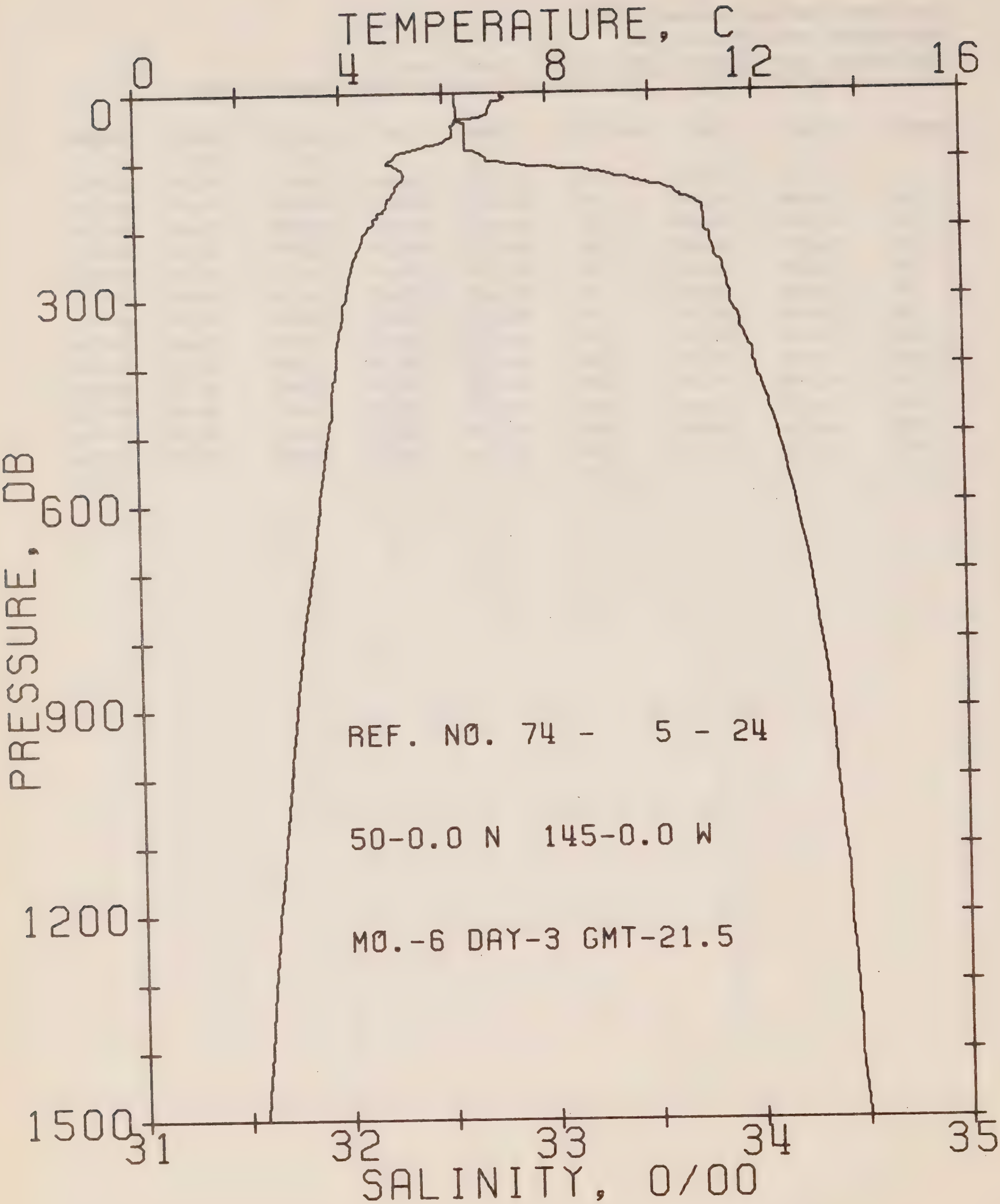
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 21 DATE 30/ 5/74
POSITION 50- 0.0N, 145- 0.0W GMT 19.0
RESULTS OF STP CAST 127 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.76	32.61	0	25.59	240.1	0.0	0.0	1475.
10	6.69	32.61	10	25.61	239.4	0.24	0.01	1475.
20	6.65	32.62	20	25.62	238.5	0.48	0.05	1475.
30	6.52	32.62	30	25.63	237.0	0.72	0.11	1475.
50	5.77	32.67	50	25.77	224.5	1.18	0.30	1472.
75	5.41	32.70	75	25.83	218.6	1.73	0.65	1471.
100	4.76	32.77	99	25.96	206.5	2.26	1.12	1469.
125	4.80	33.33	124	26.40	165.0	2.73	1.66	1470.
150	4.77	33.64	149	26.65	141.8	3.10	2.18	1471.
175	4.63	33.76	174	26.76	131.4	3.44	2.74	1471.
200	4.51	33.77	199	26.78	129.3	3.77	3.37	1471.
225	4.34	33.81	223	26.83	125.1	4.09	4.05	1470.
250	4.24	33.84	248	26.86	122.0	4.40	4.80	1470.
300	4.06	33.89	298	26.92	116.8	5.00	6.48	1471.


TEMPERATURE, C
0
4
8
12
16
PRESSURE, DB
0
60
120
180
240
300
REF. NO. 74 - 5 - 22
50-0.0 N 145-0.0 W
MO.-6 DAY-2 GMT-18.5
31
32
33
34
35
SALINITY, 0/00

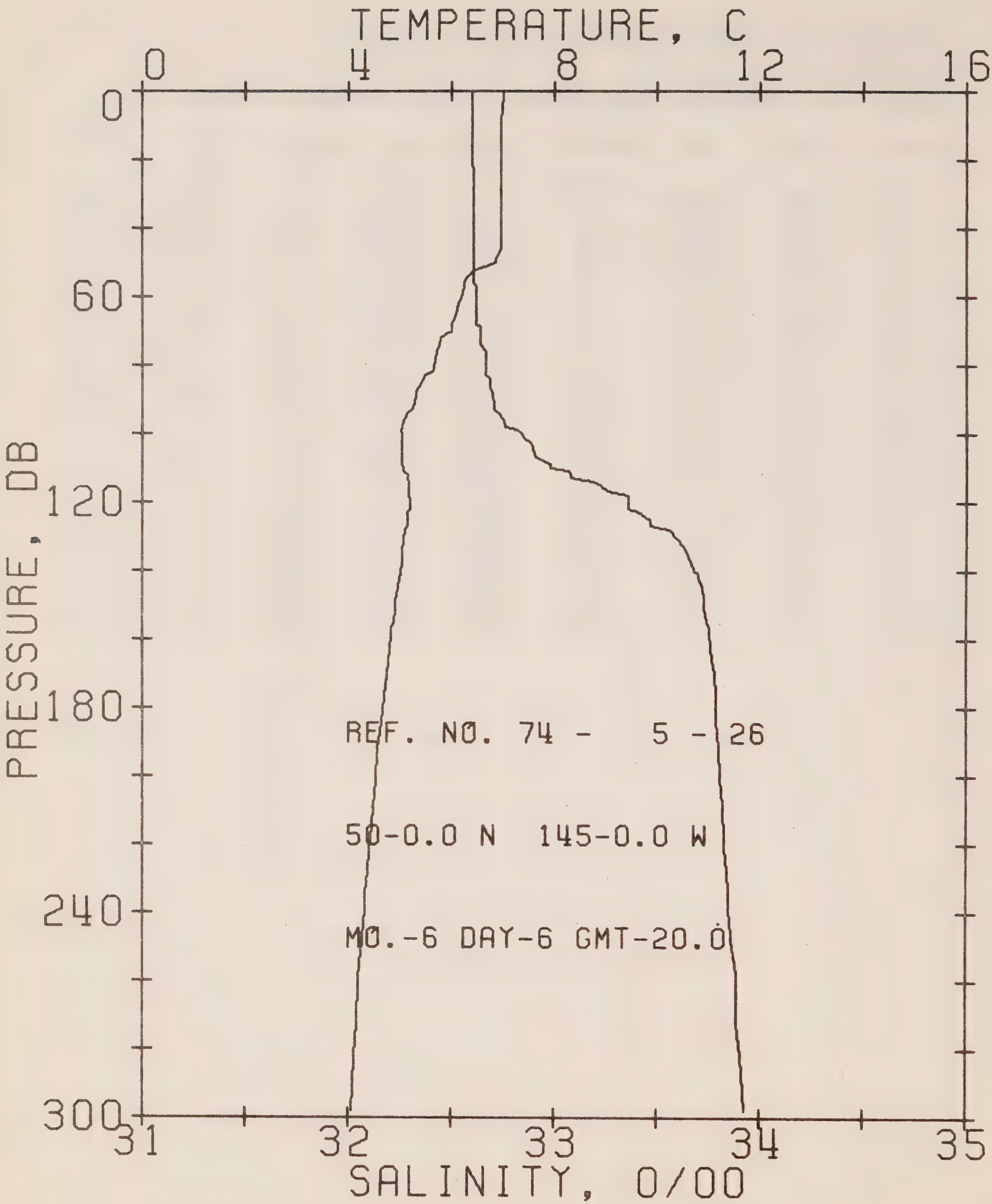
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 22 DATE 2/ 6/74
POSITION 50- 0.0N. 145- 0.0W GMT 18.5
RESULTS OF STP CAST 118 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	6.86	32.59	0	25.57	242.9	0.0	0.0	1475.
10	6.86	32.59	10	25.57	243.2	0.24	0.01	1476.
20	6.85	32.59	20	25.57	243.2	0.49	0.05	1476.
30	6.85	32.59	30	25.57	243.3	0.73	0.11	1476.
50	6.23	32.63	50	25.68	232.8	1.21	0.31	1474.
75	6.15	32.63	75	25.69	232.3	1.79	0.68	1474.
100	5.05	32.82	99	25.97	205.8	2.34	1.17	1470.
125	5.06	33.50	124	26.50	155.2	2.79	1.68	1471.
150	4.91	33.74	149	26.71	135.8	3.15	2.18	1471.
175	4.83	33.78	174	26.75	132.1	3.48	2.73	1472.
200	4.52	33.80	199	26.80	127.5	3.81	3.35	1471.
225	4.36	33.84	223	26.85	123.1	4.12	4.03	1470.
250	4.23	33.88	248	26.89	119.1	4.42	4.76	1470.


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NØ. 74 - 5 - 24
50-0.0 N 145-0.0 W
MØ.-6 DAY-3 GMT-21.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 24   DATE 3/ 6/74
POSITION 50- 0.0N, 145- 0.0W   GMT 21.5
RESULTS OF STP CAST   205 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.14	32.56	0	25.50	248.7	0.0	0.0	1476.
10	7.19	32.56	10	25.50	249.7	0.25	0.01	1477.
20	6.90	32.57	20	25.54	245.4	0.50	0.05	1476.
30	6.87	32.57	30	25.55	245.0	0.74	0.11	1476.
50	6.18	32.61	50	25.67	233.9	1.22	0.31	1473.
75	5.82	32.61	75	25.71	229.9	1.80	0.68	1472.
100	4.92	32.71	99	25.90	212.6	2.35	1.17	1469.
125	5.20	33.40	124	26.41	164.3	2.81	1.70	1472.
150	4.98	33.65	149	26.63	143.3	3.20	2.23	1472.
175	4.75	33.75	174	26.74	133.5	3.54	2.80	1471.
200	4.49	33.76	199	26.77	130.2	3.87	3.43	1471.
225	4.34	33.80	223	26.82	126.1	4.19	4.12	1470.
250	4.21	33.84	248	26.87	121.5	4.50	4.87	1470.
300	4.07	33.88	298	26.91	117.6	5.09	6.54	1471.
400	3.85	34.00	397	27.03	107.2	6.21	10.53	1471.
500	3.67	34.11	496	27.14	97.9	7.24	15.23	1472.
600	3.50	34.19	595	27.22	91.0	8.19	20.52	1473.
800	3.14	34.31	793	27.34	79.7	9.89	32.63	1475.
1000	2.85	34.38	990	27.42	72.9	11.41	46.56	1478.
1200	2.60	34.43	1188	27.49	67.3	12.81	62.22	1480.


TEMPERATURE, C
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12
16
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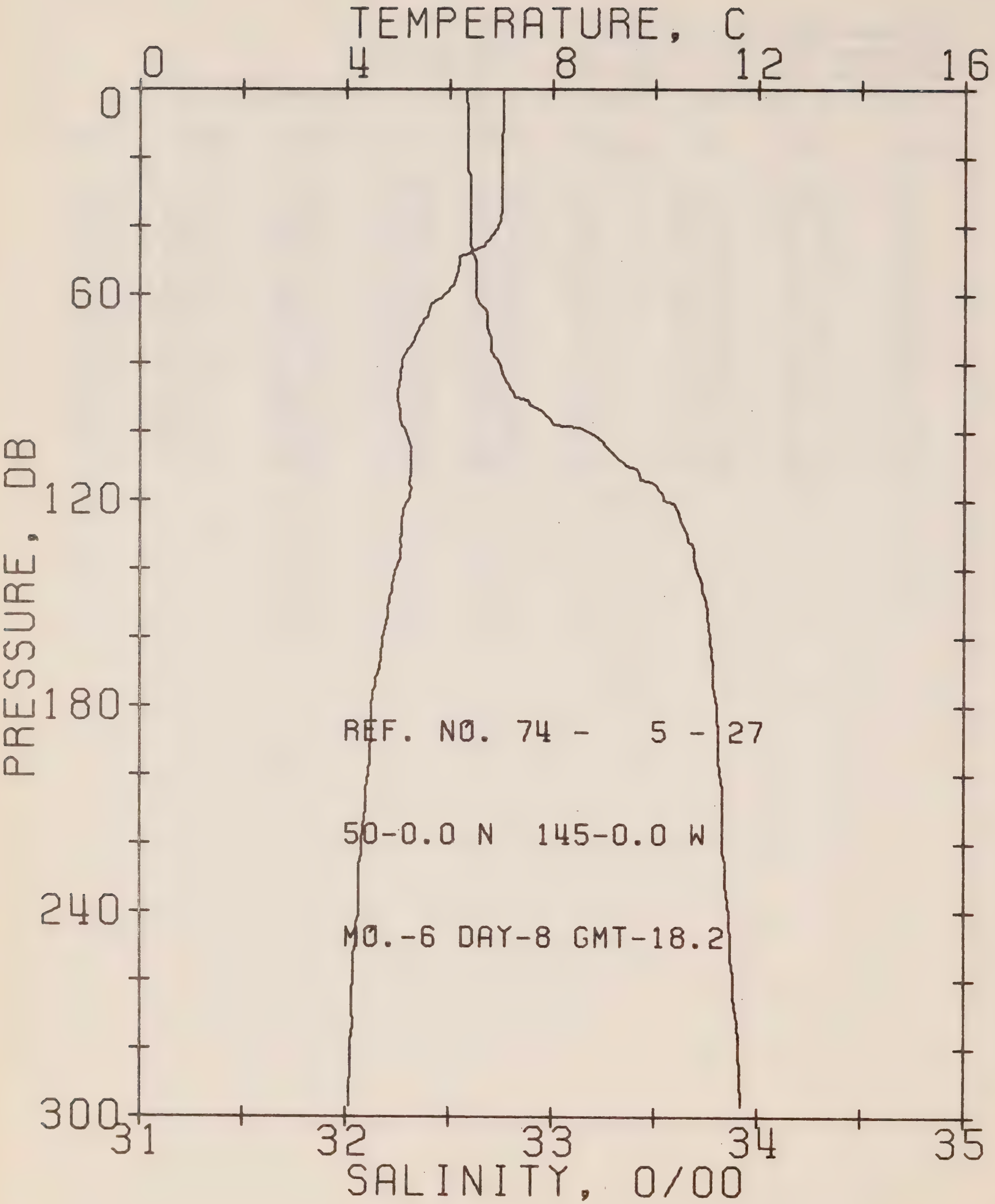
60
120
180
240
300
PRESSURE, DB
REF. NO. 74 - 5 - 26
50-0.0 N 145-0.0 W
MO.-6 DAY-6 GMT-20.0
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 26 DATE 6/ 6/74
POSITION 50- 0.0N. 145- 0.0W GMT 20.0
RESULTS OF STP CAST 99 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.01	32.60	0	25.55	244.0	0.0	0.0	1476.
10	6.95	32.60	10	25.56	243.6	0.24	0.01	1476.
20	6.95	32.60	20	25.56	243.7	0.49	0.05	1476.
30	6.95	32.61	30	25.57	243.1	0.73	0.11	1476.
50	6.85	32.61	50	25.58	242.1	1.22	0.31	1476.
75	5.72	32.65	75	25.76	225.4	1.80	0.68	1472.
100	5.03	32.84	99	25.99	204.1	2.34	1.16	1470.
125	5.14	33.47	124	26.47	158.3	2.80	1.69	1472.
150	4.91	33.73	149	26.70	136.5	3.16	2.19	1471.
175	4.71	33.79	174	26.77	130.3	3.50	2.74	1471.
200	4.54	33.81	199	26.81	127.1	3.82	3.36	1471.
225	4.38	33.84	223	26.85	123.7	4.13	4.04	1471.
250	4.25	33.87	248	26.88	120.2	4.44	4.77	1470.


TEMPERATURE, C
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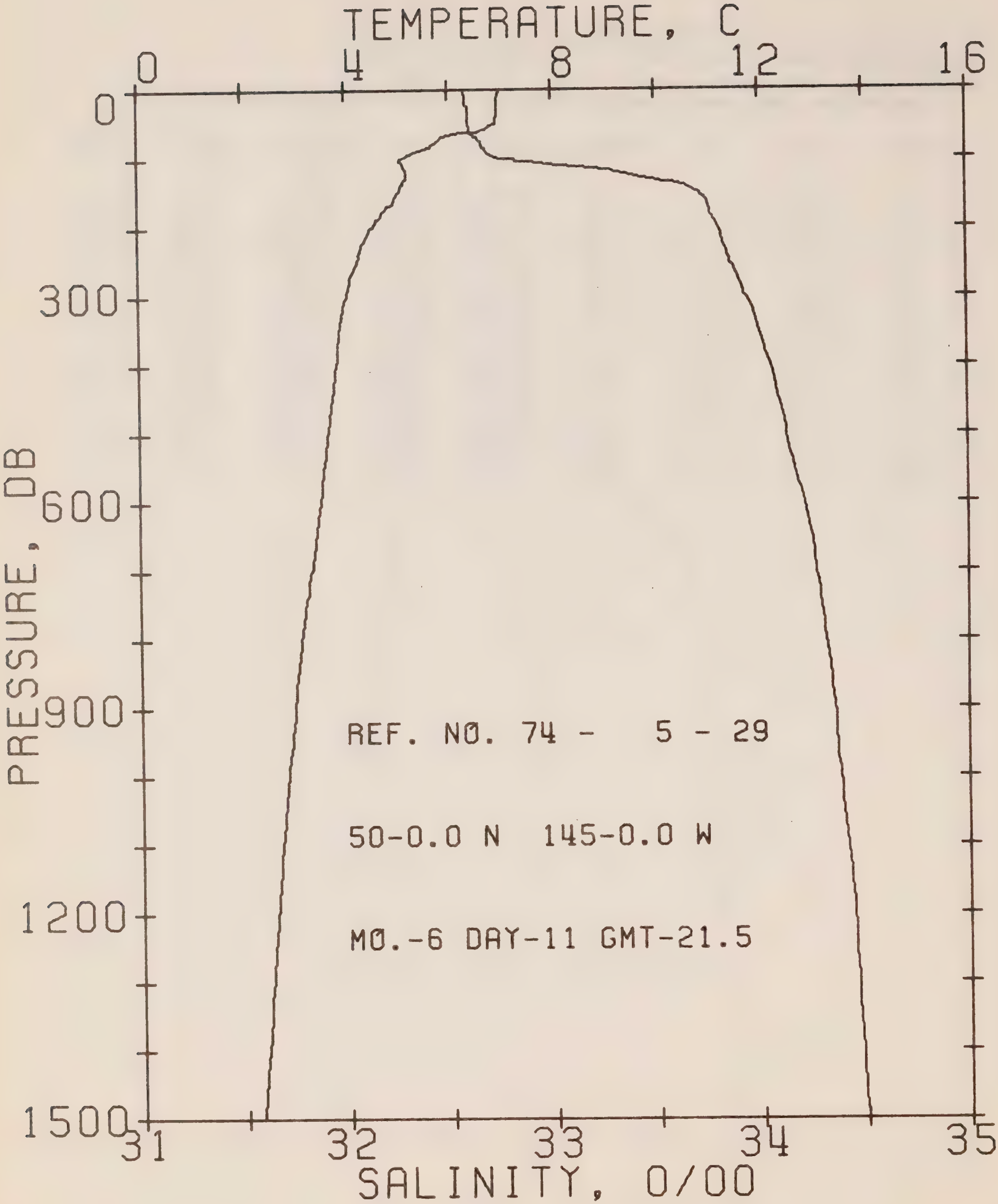
4
8
12
16
0
60
120
180
240
300
PRESSURE, DB
REF. NO. 74 - 5 - 27
50-0.0 N 145-0.0 W
MO.-6 DAY-8 GMT-18.2
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 27 DATE 8/ 6/74
POSITION 50- 0.0N, 145- 0.0W GMT 18.2
RESULTS OF STP CAST 117 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.03	32.58	0	25.54	245.8	0.0	0.0	1476.
10	7.03	32.59	10	25.54	245.4	0.25	0.01	1476.
20	7.02	32.59	20	25.54	245.4	0.49	0.05	1476.
30	7.01	32.60	30	25.55	244.7	0.74	0.11	1476.
50	6.19	32.62	50	25.68	232.9	1.22	0.31	1474.
75	5.23	32.70	75	25.85	216.5	1.78	0.67	1470.
100	5.15	33.16	99	26.23	181.1	2.29	1.12	1471.
125	5.09	33.62	124	26.59	146.7	2.70	1.59	1472.
150	4.82	33.74	149	26.73	134.4	3.05	2.08	1471.
175	4.54	33.78	174	26.79	128.7	3.38	2.62	1470.
200	4.43	33.82	199	26.83	125.3	3.70	3.23	1470.
225	4.26	33.84	223	26.86	122.2	4.01	3.89	1470.
250	4.17	33.87	248	26.90	119.1	4.31	4.63	1470.


TEMPERATURE, C
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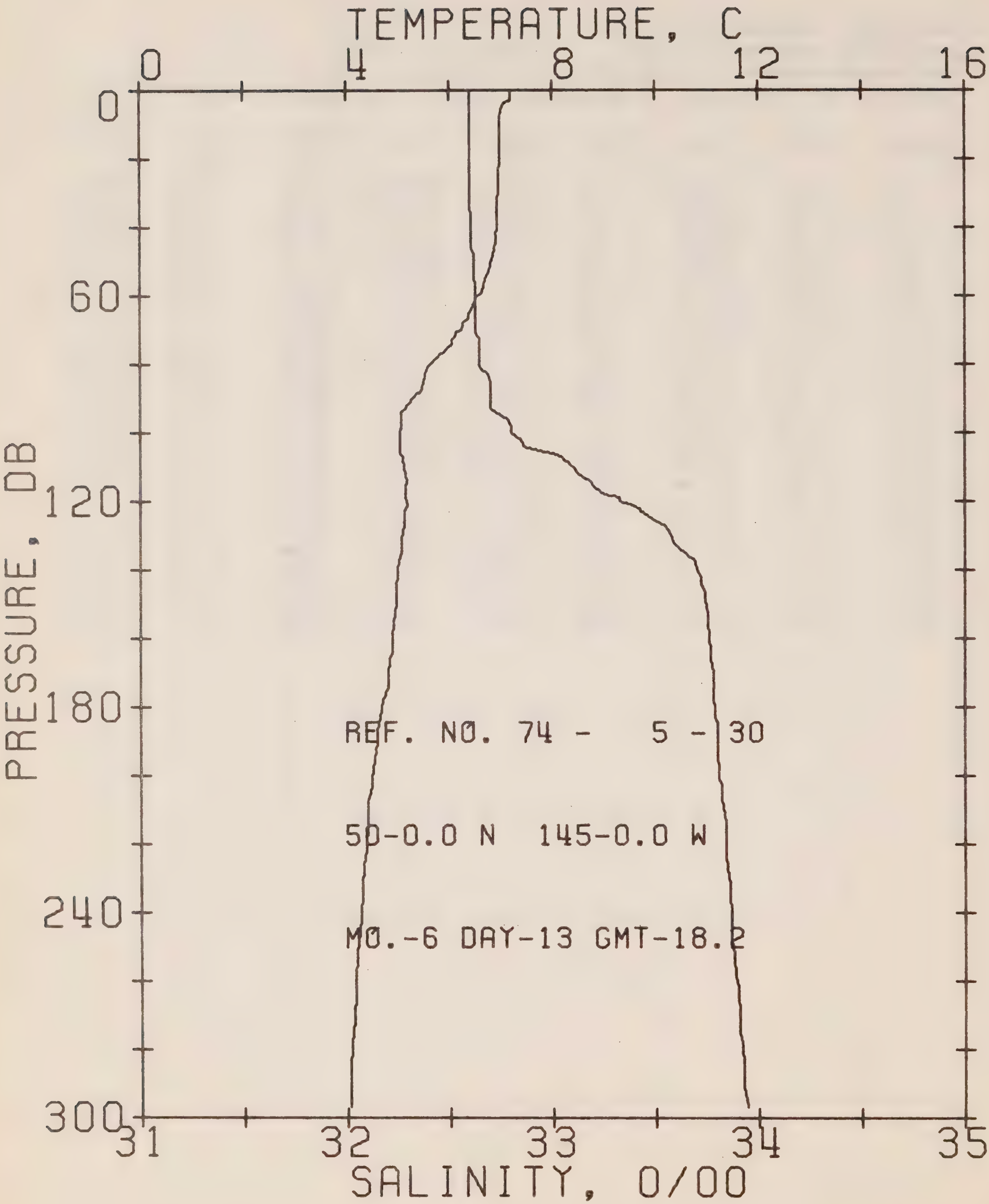
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 74 - 5 - 29
50-0.0 N 145-0.0 W
MO.-6 DAY-11 GMT-21.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 29 DATE 11/ 6/74
POSITION 50- 0.0N, 145- 0.0W GMT 21.5
RESULTS OF STP CAST 178 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.01	32.58	0	25.54	245.5	0.0	0.0	1476.
10	6.97	32.59	10	25.55	244.8	0.25	0.01	1476.
20	6.96	32.59	20	25.55	244.6	0.49	0.05	1476.
30	6.95	32.60	30	25.56	244.0	0.73	0.11	1476.
50	6.88	32.60	50	25.57	243.3	1.22	0.31	1476.
75	5.79	32.66	75	25.76	225.9	1.81	0.68	1472.
100	5.07	32.79	99	25.94	208.2	2.36	1.17	1470.
125	5.21	33.41	124	26.41	163.8	2.82	1.70	1472.
150	5.01	33.72	149	26.68	138.4	3.19	2.22	1472.
175	4.75	33.77	174	26.75	132.0	3.53	2.78	1471.
200	4.51	33.81	199	26.81	126.9	3.85	3.40	1471.
225	4.32	33.83	223	26.85	123.4	4.17	4.08	1470.
250	4.23	33.86	248	26.88	120.5	4.47	4.81	1470.
300	4.02	33.94	298	26.97	112.7	5.05	6.44	1470.
400	3.81	34.05	397	27.08	102.9	6.12	10.25	1471.
500	3.63	34.13	496	27.16	96.0	7.12	14.80	1472.
600	3.49	34.21	595	27.24	89.2	8.04	19.99	1473.
800	3.11	34.32	793	27.36	78.6	9.71	31.87	1475.
1000	2.83	34.38	990	27.43	72.1	11.22	45.64	1477.
1200	2.59	34.44	1188	27.50	66.2	12.60	61.10	1480.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8
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16
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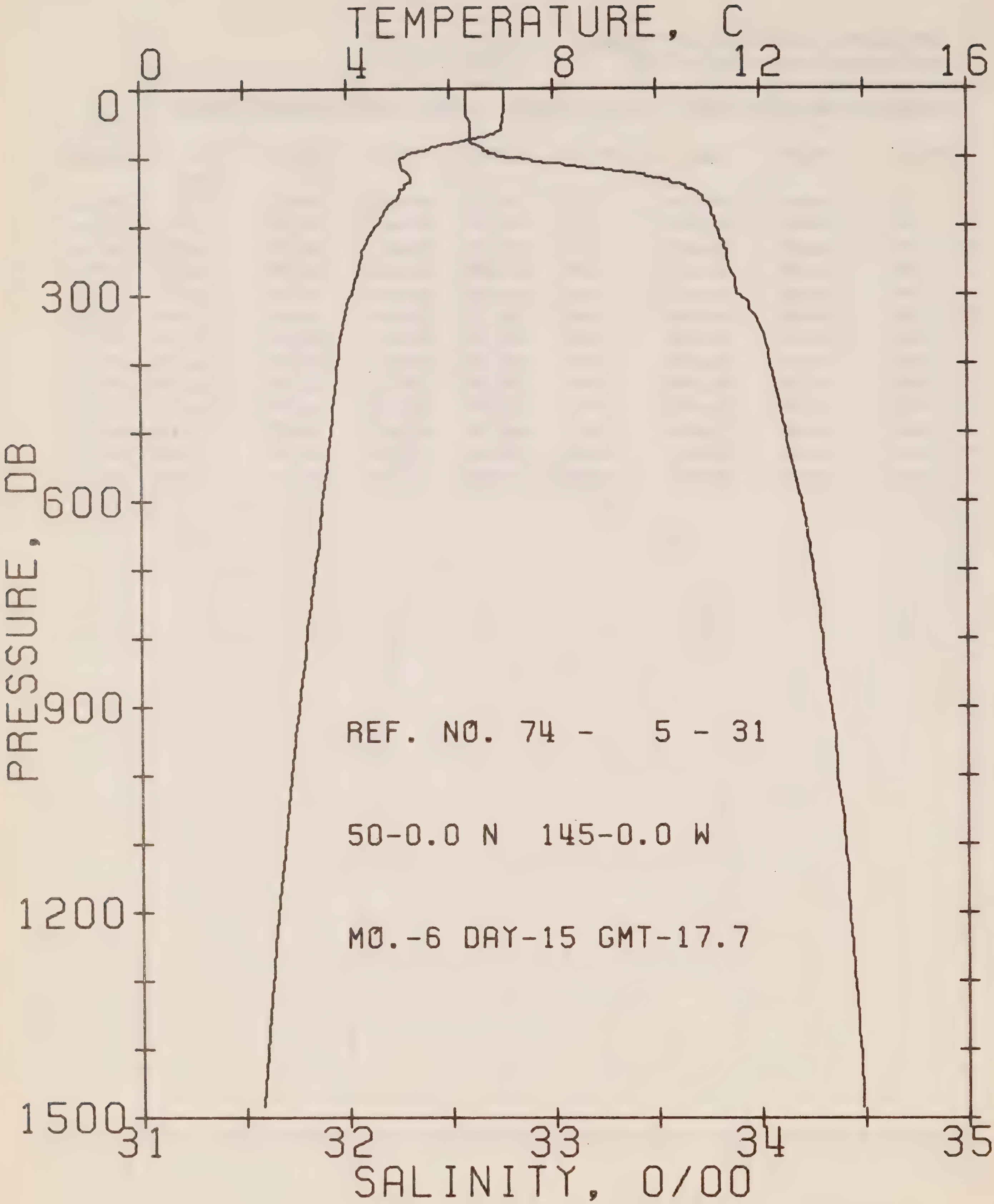
60
120
180
240
300
PRESSURE, DB
REF. NO. 74 - 5 - 30
50-0.0 N 145-0.0 W
MO.-6 DAY-13 GMT-18.2
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 30   DATE 13/ 6/74
POSITION 50- 0.0N, 145- 0.0W   GMT 18.2
RESULTS OF STP CAST   119 POINTS TAKEN FROM ANALOG TRACE

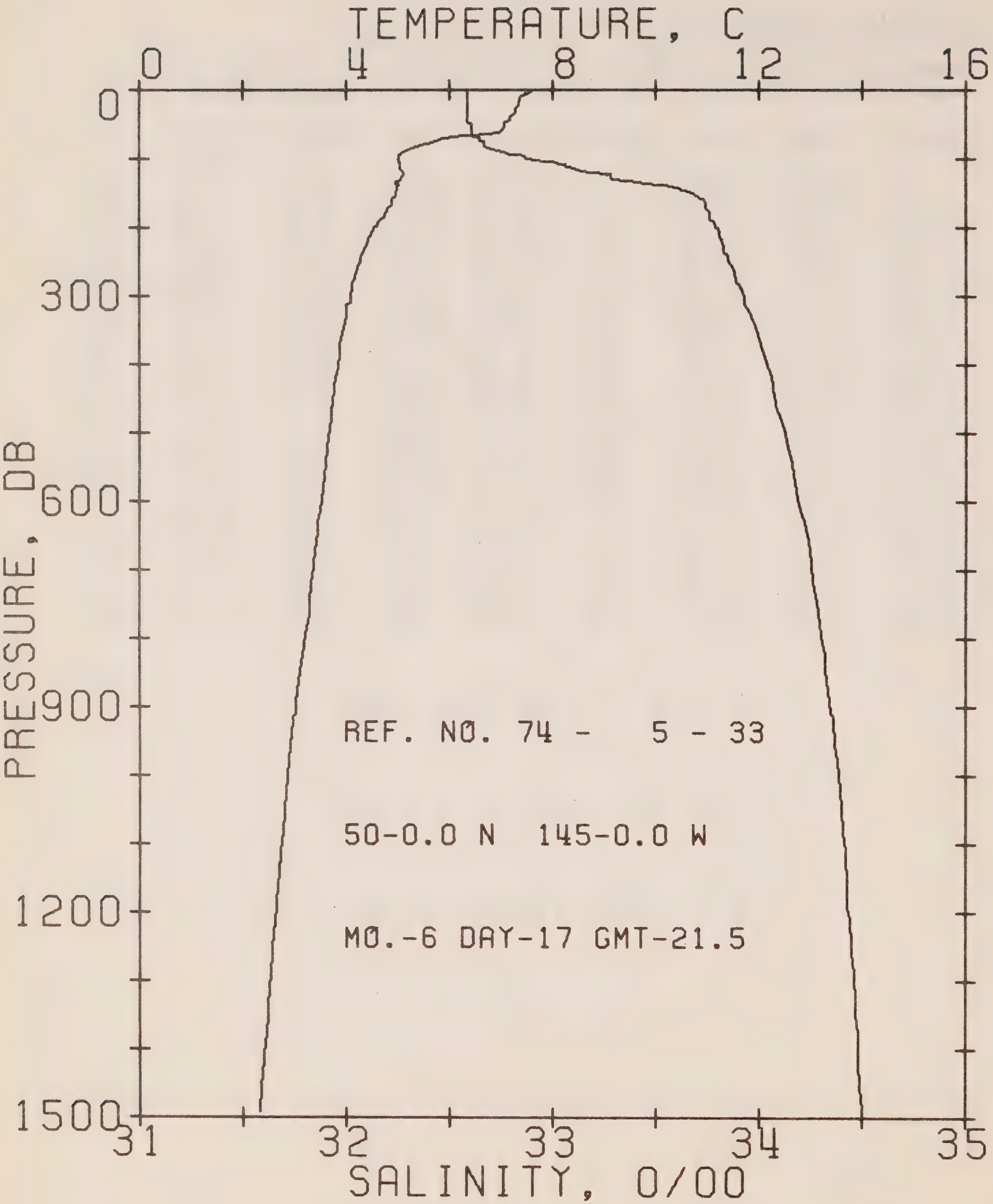
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.21	32.60	0	25.53	246.6	0.0	0.0	1477.
10	6.98	32.60	10	25.56	244.0	0.25	0.01	1476.
20	6.97	32.60	20	25.56	244.0	0.49	0.05	1476.
30	6.95	32.60	30	25.56	243.8	0.73	0.11	1476.
50	6.82	32.62	50	25.59	241.0	1.22	0.31	1476.
75	5.98	32.65	75	25.73	228.8	1.81	0.68	1473.
100	5.05	32.80	99	25.95	207.3	2.35	1.17	1470.
125	5.11	33.49	124	26.49	156.5	2.81	1.69	1471.
150	4.95	33.74	149	26.71	136.0	3.17	2.19	1472.
175	4.76	33.78	174	26.76	131.5	3.50	2.74	1471.
200	4.50	33.81	199	26.81	126.5	3.82	3.36	1471.
225	4.33	33.84	223	26.86	122.4	4.13	4.03	1470.
250	4.20	33.87	248	26.90	119.0	4.44	4.76	1470.



TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NØ. 74 - 5 - 31
50-0.0 N 145-0.0 W
MØ.-6 DAY-15 GMT-17.7
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 31 DATE 15/ 6/74
POSITION 50- 0.0N. 145- 0.0W GMT 17.7
RESULTS OF STP CAST 197 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.08	32.58	0	25.53	246.4	0.0	0.0	1476.
10	7.08	32.58	10	25.53	246.8	0.25	0.01	1476.
20	7.08	32.58	20	25.53	246.9	0.49	0.05	1477.
30	7.06	32.58	30	25.53	246.8	0.74	0.11	1477.
50	7.02	32.60	50	25.55	245.0	1.23	0.31	1477.
75	6.29	32.60	75	25.65	236.3	1.84	0.70	1474.
100	5.10	32.80	99	25.95	207.9	2.40	1.19	1470.
125	5.23	33.45	124	26.45	160.8	2.86	1.72	1472.
150	5.05	33.70	149	26.66	140.4	3.23	2.24	1472.
175	4.76	33.77	174	26.75	132.1	3.57	2.81	1471.
200	4.55	33.79	199	26.79	128.6	3.90	3.43	1471.
225	4.36	33.83	223	26.84	123.8	4.21	4.11	1470.
250	4.26	33.84	248	26.86	122.1	4.52	4.86	1470.
300	4.07	33.90	298	26.93	116.2	5.12	6.53	1471.
400	3.81	34.05	397	27.07	103.2	6.19	10.36	1471.
500	3.66	34.12	496	27.15	96.9	7.19	14.94	1472.
600	3.50	34.20	595	27.23	90.1	8.13	20.19	1473.
800	3.20	34.30	793	27.33	81.0	9.84	32.34	1476.
1000	2.88	34.37	990	27.42	73.6	11.38	46.44	1478.
1200	2.63	34.43	1188	27.49	67.6	12.78	62.15	1480.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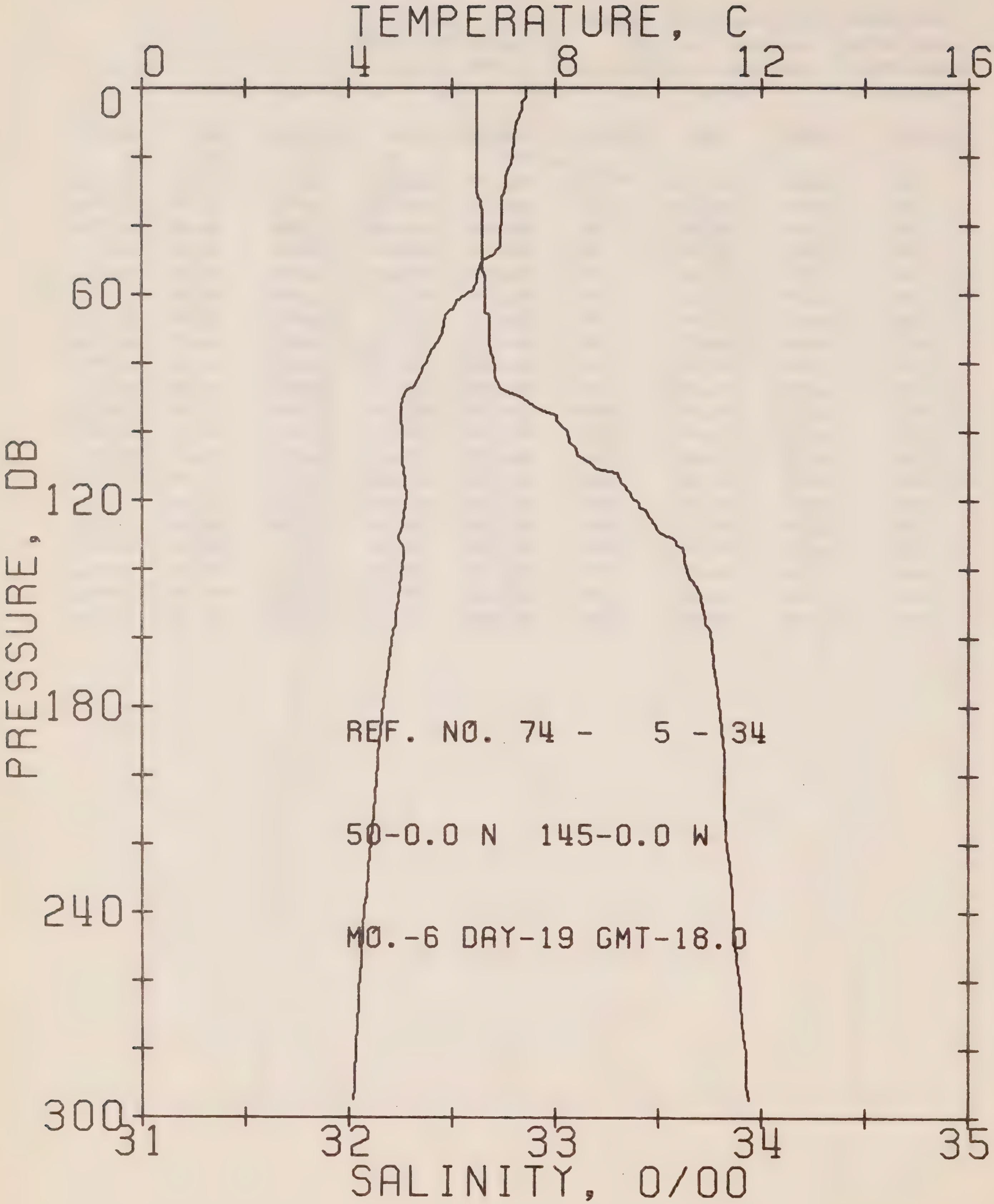
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 74 - 5 - 33
50-0.0 N 145-0.0 W
MO.-6 DAY-17 GMT-21.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 33 DATE 17/ 6/74
POSITION 50- 0.0N. 145- 0.0W GMT 21.5
RESULTS OF STP CAST 181 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.58	32.59	0	25.47	252.2	0.0	0.0	1478.
10	7.38	32.59	10	25.50	249.9	0.25	0.01	1478.
20	7.33	32.59	20	25.50	249.4	0.50	0.05	1478.
30	7.27	32.59	30	25.51	248.8	0.75	0.11	1477.
50	7.05	32.61	50	25.56	244.7	1.25	0.32	1477.
75	5.67	32.67	75	25.78	223.7	1.84	0.69	1472.
100	4.99	32.87	99	26.01	201.4	2.37	1.17	1470.
125	5.09	33.28	124	26.33	172.0	2.83	1.70	1471.
150	4.95	33.68	149	26.66	140.7	3.22	2.24	1471.
175	4.78	33.75	174	26.73	134.0	3.57	2.81	1471.
200	4.53	33.80	199	26.80	127.6	3.89	3.43	1471.
225	4.38	33.82	223	26.84	124.6	4.21	4.12	1471.
250	4.25	33.85	248	26.87	121.2	4.52	4.86	1470.
300	4.08	33.92	298	26.95	114.4	5.10	6.50	1471.
400	3.83	34.04	397	27.06	104.1	6.19	10.38	1471.
500	3.66	34.13	496	27.15	96.4	7.20	14.98	1472.
600	3.52	34.19	595	27.22	91.1	8.13	20.23	1474.
800	3.19	34.30	793	27.34	80.5	9.84	32.36	1476.
1000	2.86	34.39	990	27.44	71.9	11.36	46.27	1478.
1200	2.63	34.43	1188	27.49	67.2	12.75	61.81	1480.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120
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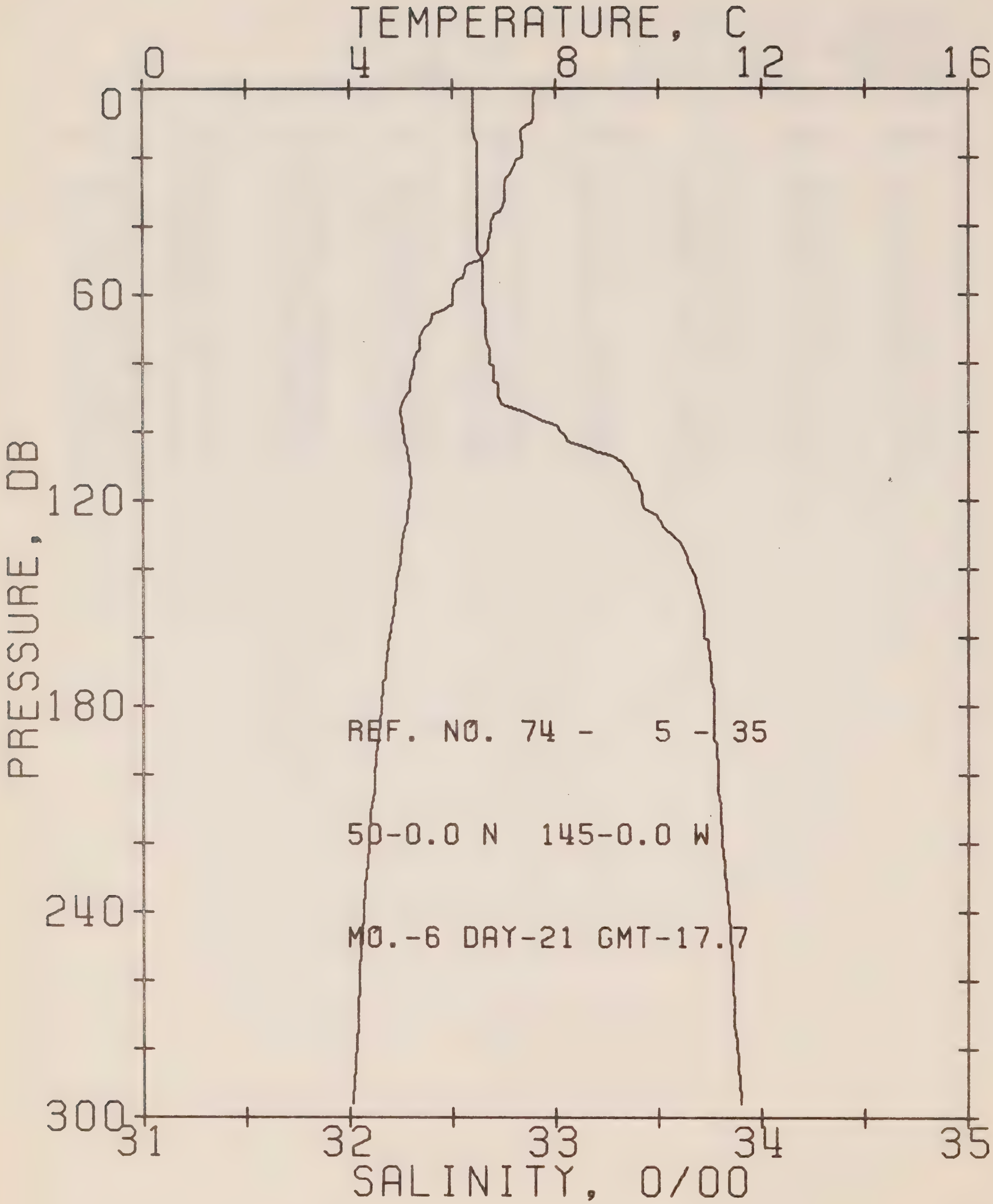
300
PRESSURE, DB
REF. NO. 74 - 5 - 34
50-0.0 N 145-0.0 W
MO.-6 DAY-19 GMT-18.0
31
32
33
34
35
SALINITY, 0/00

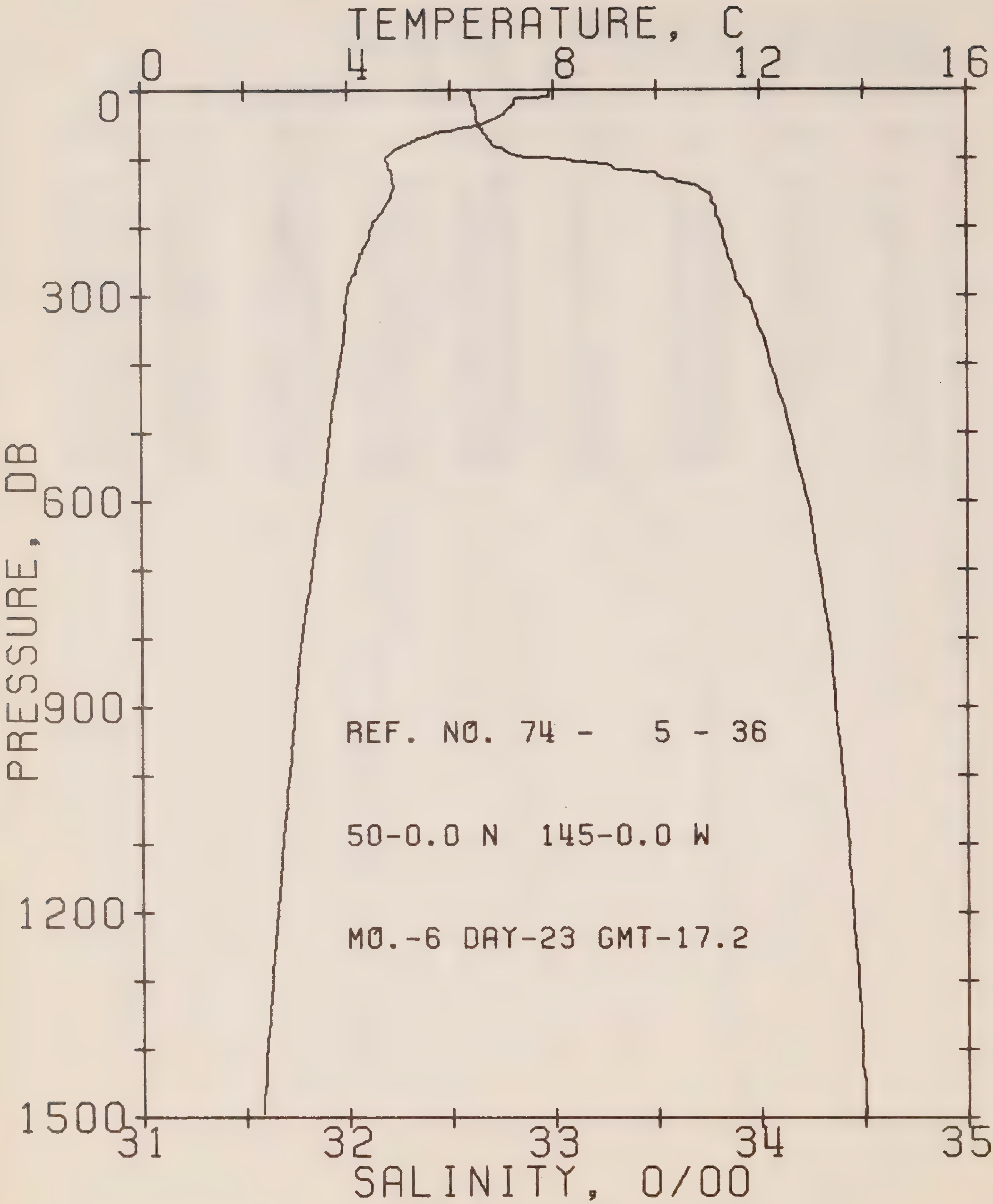
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 34 DATE 19/ 6/74
POSITION 50- 0.0N, 145- 0.0W GMT 18.0
RESULTS OF STP CAST 121 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.44	32.62	0	25.51	248.2	0.0	0.0	1478.
10	7.26	32.62	10	25.54	246.2	0.25	0.01	1477.
20	7.15	32.62	20	25.55	244.8	0.49	0.05	1477.
30	7.00	32.62	30	25.57	243.1	0.74	0.11	1476.
50	6.61	32.65	50	25.65	236.1	1.22	0.31	1475.
75	5.65	32.68	75	25.79	222.7	1.79	0.67	1472.
100	5.04	33.06	99	26.16	187.6	2.31	1.13	1470.
125	5.06	33.46	124	26.47	158.2	2.74	1.63	1471.
150	4.94	33.71	149	26.69	138.2	3.11	2.14	1472.
175	4.70	33.79	174	26.78	130.0	3.44	2.70	1471.
200	4.54	33.82	199	26.82	126.2	3.76	3.31	1471.
225	4.38	33.84	223	26.85	122.9	4.08	3.98	1471.
250	4.26	33.88	248	26.89	119.5	4.38	4.72	1471.


TEMPERATURE, C
0
4
8
12
16
0
60
120
180
240
300
PRESSURE, DB
REF. NO. 74 - 5 - 35
50-0.0 N 145-0.0 W
MO.-6 DAY-21 GMT-17.7
31
32
33
34
35
SALINITY, 0/00

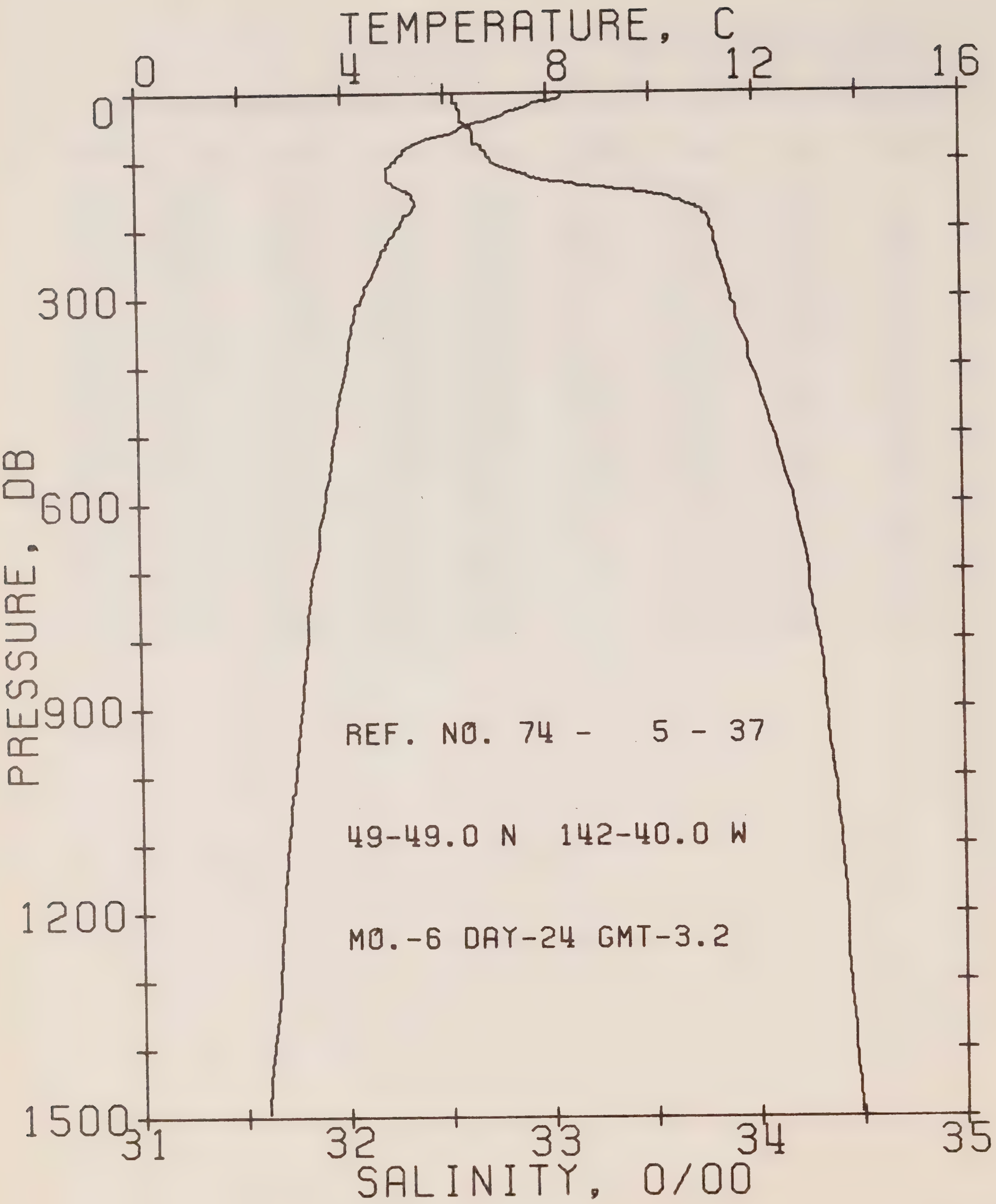
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 35 DATE 21/ 6/74
POSITION 50- 0.0N, 145- 0.0W GMT 17.7
RESULTS OF STP CAST 124 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.59	32.60	0	25.47	251.6	0.0	0.0	1478.
10	7.54	32.60	10	25.48	251.3	0.25	0.01	1478.
20	7.35	32.62	20	25.52	247.4	0.50	0.05	1478.
30	7.01	32.62	30	25.57	243.2	0.74	0.11	1476.
50	6.55	32.64	50	25.65	236.1	1.23	0.31	1475.
75	5.35	32.67	75	25.82	219.7	1.79	0.67	1471.
100	5.05	33.03	99	26.13	190.1	2.32	1.14	1470.
125	5.11	33.50	124	26.50	155.7	2.74	1.62	1472.
150	4.88	33.71	149	26.69	137.9	3.11	2.13	1471.
175	4.64	33.77	174	26.77	130.9	3.44	2.69	1471.
200	4.47	33.79	199	26.80	127.8	3.77	3.31	1470.
225	4.35	33.82	223	26.84	124.6	4.08	3.99	1470.
250	4.23	33.85	248	26.88	120.9	4.39	4.73	1470.


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 74 - 5 - 36
50-0.0 N 145-0.0 W
MO.-6 DAY-23 GMT-17.2
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 36 DATE 23/ 6/74
POSITION 50- 0.0N, 145- 0.0W GMT 17.2
RESULTS OF STP CAST 190 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	7.94	32.59	0	25.42	257.1	0.0	0.0	1480.
10	7.78	32.60	10	25.45	254.5	0.26	0.01	1479.
20	7.24	32.61	20	25.53	246.7	0.51	0.05	1477.
30	7.10	32.63	30	25.56	243.9	0.75	0.11	1477.
50	6.62	32.64	50	25.64	237.0	1.23	0.31	1475.
75	5.25	32.70	75	25.85	216.7	1.80	0.67	1470.
100	4.76	33.05	99	26.18	185.4	2.31	1.13	1469.
125	4.89	33.51	124	26.53	152.5	2.73	1.61	1471.
150	4.87	33.75	149	26.72	134.7	3.09	2.10	1471.
175	4.68	33.79	174	26.78	129.8	3.42	2.65	1471.
200	4.47	33.82	199	26.82	125.7	3.74	3.26	1471.
225	4.36	33.83	223	26.84	123.8	4.05	3.94	1470.
250	4.20	33.86	248	26.88	120.2	4.35	4.67	1470.
300	3.98	33.92	298	26.96	113.3	4.94	6.31	1470.
400	3.84	34.05	397	27.07	103.3	6.02	10.15	1471.
500	3.64	34.15	496	27.17	94.9	7.00	14.67	1472.
600	3.49	34.23	595	27.25	87.9	7.92	19.79	1473.
800	3.09	34.34	793	27.37	77.1	9.57	31.50	1475.
1000	2.84	34.40	990	27.45	70.9	11.05	45.08	1478.
1200	2.60	34.45	1188	27.50	66.0	12.41	60.39	1480.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8
12
16
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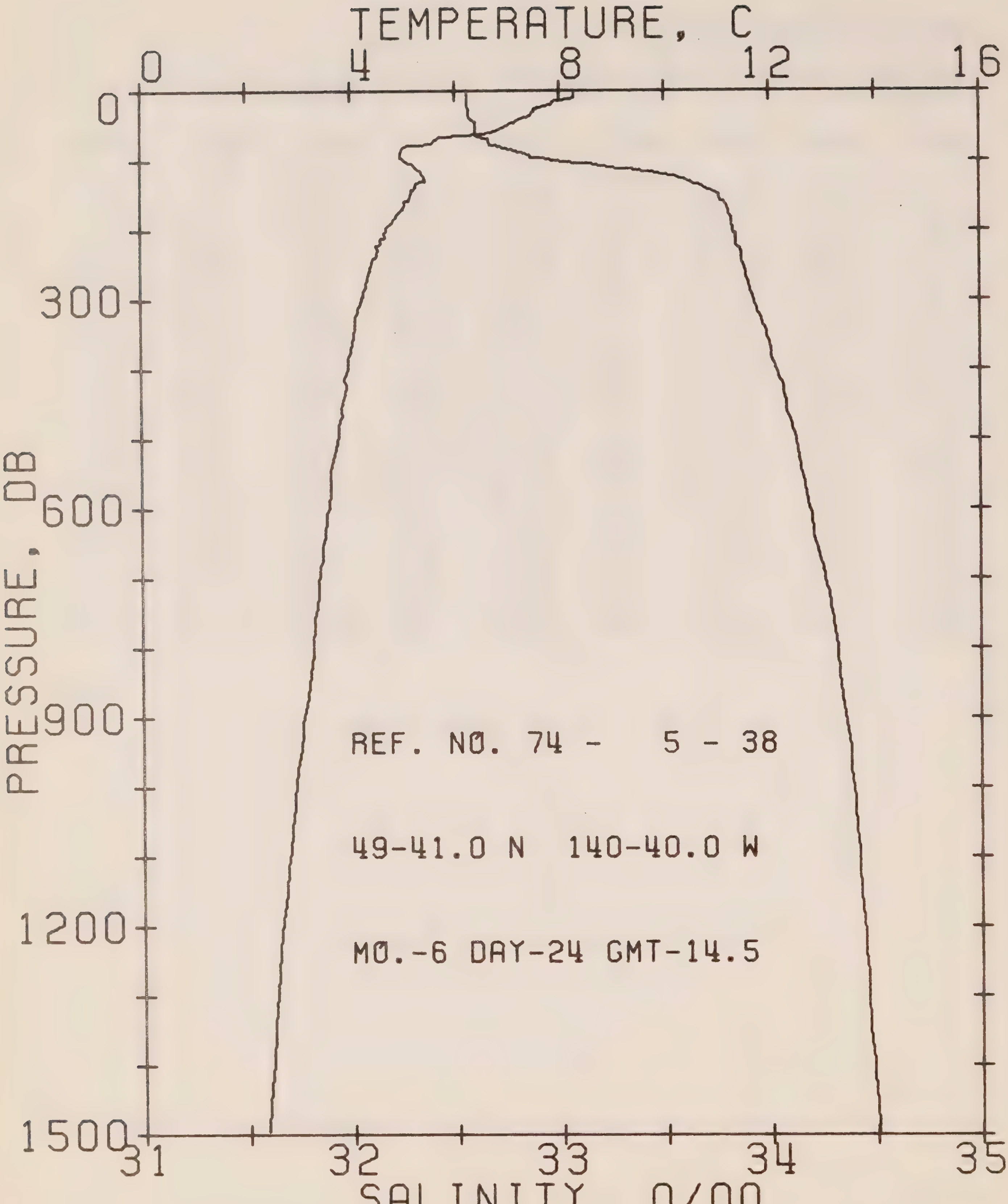
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 74 - 5 - 37
49-49.0 N 142-40.0 W
MO.-6 DAY-24 GMT-3.2
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 37 DATE 24/ 6/74
POSITION 49-49.0N, 142-40.0W GMT 3.2
RESULTS OF STP CAST 210 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.28	32.55	0	25.34	264.8	0.0	0.0	1481.
10	8.12	32.55	10	25.36	263.0	0.26	0.01	1480.
20	7.61	32.57	20	25.45	254.6	0.52	0.05	1479.
30	7.20	32.58	30	25.51	248.6	0.77	0.12	1477.
50	6.31	32.63	50	25.67	233.9	1.26	0.31	1474.
75	5.39	32.68	75	25.82	219.8	1.83	0.68	1471.
100	5.04	32.73	99	25.90	212.4	2.37	1.16	1470.
125	4.89	32.94	124	26.09	194.9	2.88	1.74	1470.
150	5.36	33.53	149	26.49	156.6	3.32	2.35	1473.
175	5.31	33.75	174	26.67	139.8	3.68	2.96	1473.
200	5.04	33.80	199	26.74	133.3	4.02	3.61	1473.
225	4.86	33.82	223	26.78	130.0	4.35	4.32	1473.
250	4.67	33.84	248	26.82	126.9	4.67	5.10	1472.
300	4.34	33.89	298	26.89	119.8	5.29	6.83	1472.
400	4.04	33.98	397	27.00	110.6	6.44	10.91	1472.
500	3.81	34.09	496	27.11	100.6	7.49	15.73	1473.
600	3.62	34.19	595	27.20	92.4	8.46	21.14	1474.
800	3.24	34.30	793	27.33	81.1	10.18	33.41	1476.
1000	2.97	34.37	990	27.41	74.4	11.74	47.69	1478.
1200	2.72	34.43	1188	27.48	68.7	13.16	63.63	1480.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900
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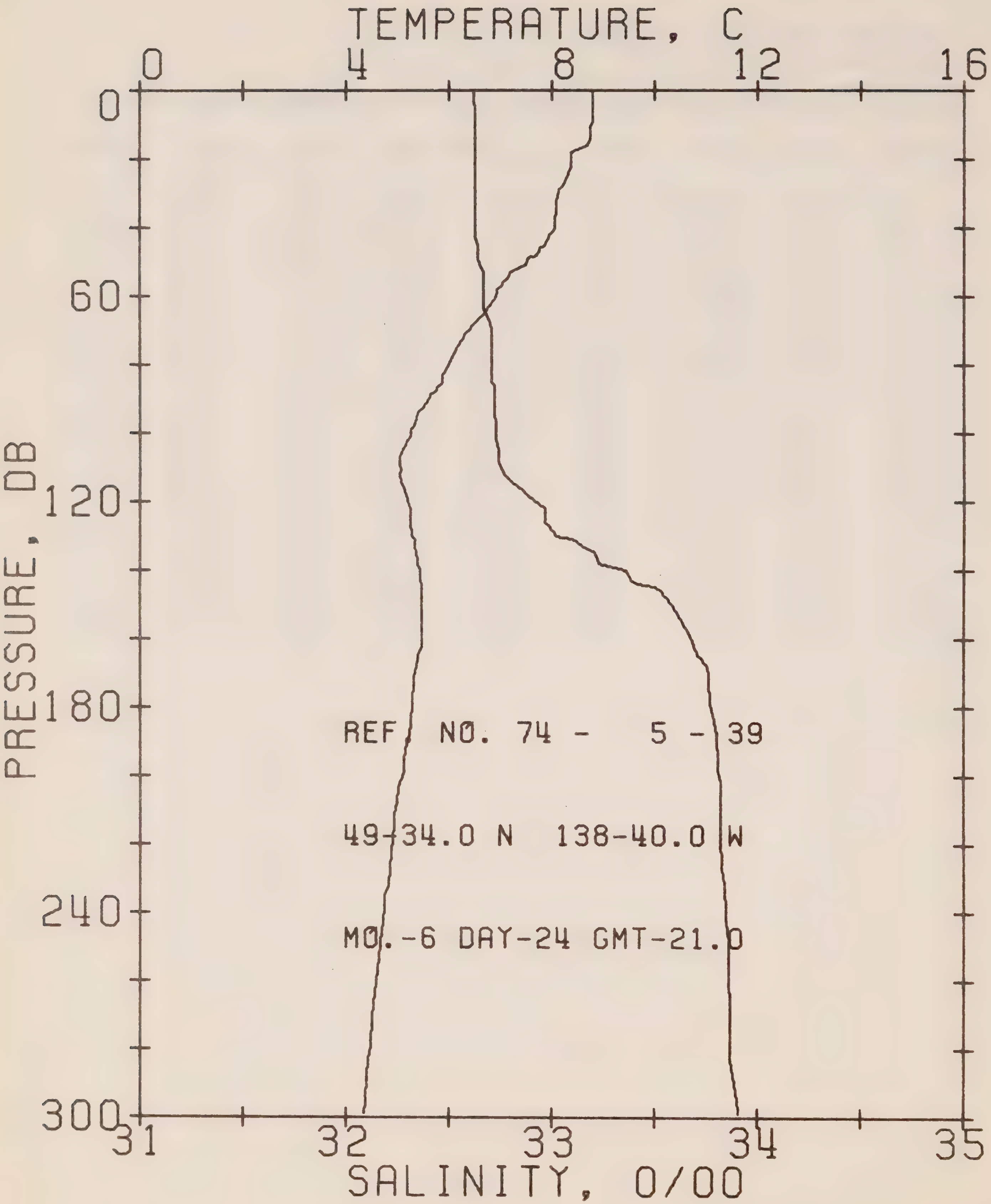
1500
PRESSURE, DB
REF. NO. 74 - 5 - 38
49-41.0 N 140-40.0 W
MO.-6 DAY-24 GMT-14.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 38 DATE 24/ 6/74
POSITION 49-41.0N, 140-40.0W GMT 14.5
RESULTS OF STP CAST 222 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.30	32.56	0	25.34	264.3	0.0	0.0	1481.
10	8.27	32.56	10	25.34	264.3	0.26	0.01	1481.
20	7.85	32.56	20	25.41	258.7	0.53	0.05	1479.
30	7.51	32.57	30	25.46	253.4	0.78	0.12	1478.
50	7.00	32.60	50	25.56	244.8	1.28	0.32	1477.
75	5.55	32.67	75	25.79	222.6	1.86	0.69	1471.
100	5.04	32.98	99	26.10	193.7	2.38	1.15	1470.
125	5.42	33.58	124	26.53	153.2	2.81	1.64	1473.
150	5.15	33.76	149	26.70	137.0	3.17	2.14	1472.
175	4.92	33.81	174	26.77	130.9	3.50	2.70	1472.
200	4.68	33.83	199	26.81	127.0	3.83	3.31	1471.
225	4.51	33.85	223	26.85	123.5	4.14	4.00	1471.
250	4.37	33.87	248	26.88	120.8	4.45	4.73	1471.
300	4.20	33.92	298	26.94	115.7	5.04	6.39	1471.
400	3.93	34.03	397	27.05	105.4	6.14	10.31	1472.
500	3.74	34.13	496	27.14	97.3	7.15	14.96	1473.
600	3.56	34.19	595	27.21	91.6	8.10	20.24	1474.
800	3.25	34.32	793	27.34	80.0	9.80	32.37	1476.
1000	2.90	34.39	990	27.43	72.2	11.32	46.30	1478.
1200	2.63	34.44	1188	27.50	66.5	12.71	61.86	1480.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PRESSURE, DB
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120
180
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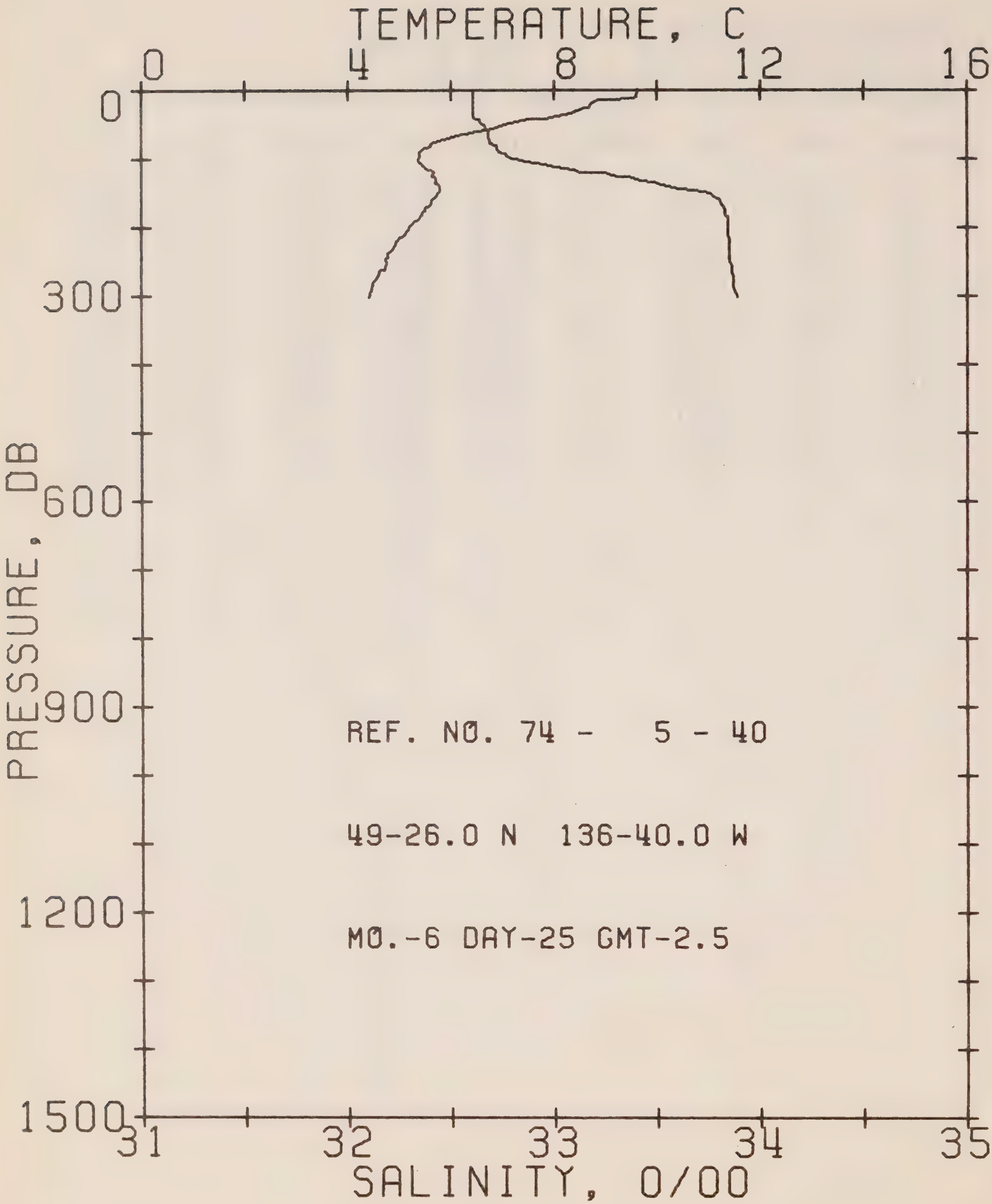
300
REF. NO. 74 - 5 - 39
49-34.0 N 138-40.0 W
MO.-6 DAY-24 GMT-21.0
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 39 DATE 24/ 6/74
POSITION 49-34.0N, 138-40.0W GMT 21.0
RESULTS OF STP CAST 106 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	8.83	32.62	0	25.31	267.5	0.0	0.0	1483.
10	8.80	32.63	10	25.32	266.8	0.27	0.01	1483.
20	8.41	32.63	20	25.38	261.2	0.53	0.05	1482.
30	8.15	32.63	30	25.42	257.7	0.79	0.12	1481.
50	7.55	32.64	50	25.51	248.7	1.30	0.33	1479.
75	6.19	32.71	75	25.75	226.8	1.89	0.70	1474.
100	5.28	32.73	99	25.87	215.1	2.45	1.20	1471.
125	5.29	32.97	124	26.06	197.4	2.97	1.79	1472.
150	5.51	33.58	149	26.52	154.6	3.41	2.41	1474.
175	5.35	33.76	174	26.68	139.2	3.77	3.01	1474.
200	5.12	33.81	199	26.75	133.2	4.11	3.66	1473.
225	4.91	33.82	223	26.77	130.6	4.44	4.37	1473.
250	4.69	33.85	248	26.82	126.1	4.76	5.15	1472.


TEMPERATURE, C
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8
12
16
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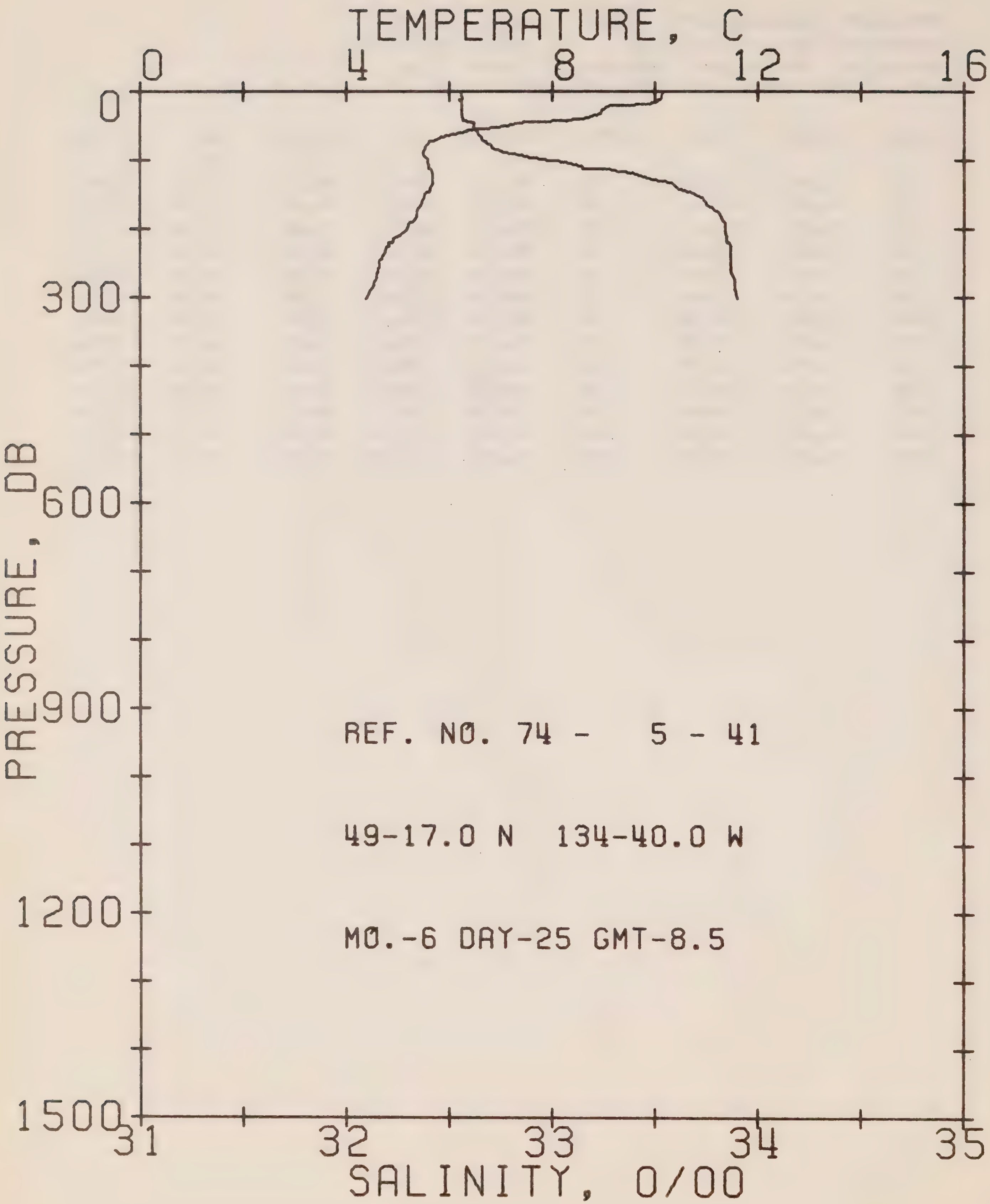
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 74 - 5 - 40
49-26.0 N 136-40.0 W
MO.-6 DAY-25 GMT-2.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 40 DATE 25/ 6/74
POSITION 49-26.0N, 136-40.0W GMT 2.5
RESULTS OF STP CAST 117 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	9.66	32.61	0	25.17	280.7	0.0	0.0	1486.
10	9.63	32.61	10	25.17	280.7	0.28	0.01	1486.
20	8.75	32.61	20	25.31	267.6	0.55	0.06	1483.
30	8.47	32.61	30	25.35	263.7	0.82	0.12	1482.
50	7.09	32.66	50	25.59	241.4	1.33	0.33	1477.
75	5.76	32.69	75	25.78	223.2	1.91	0.70	1472.
100	5.39	32.80	99	25.91	211.0	2.45	1.18	1471.
125	5.70	33.32	124	26.29	176.0	2.94	1.74	1474.
150	5.79	33.74	149	26.61	145.9	3.34	2.30	1475.
175	5.54	33.83	174	26.71	136.7	3.69	2.88	1475.
200	5.22	33.84	199	26.76	132.4	4.03	3.53	1474.
225	4.96	33.84	223	26.79	129.5	4.35	4.23	1473.
250	4.78	33.84	248	26.81	127.9	4.68	5.01	1473.



TEMPERATURE, C
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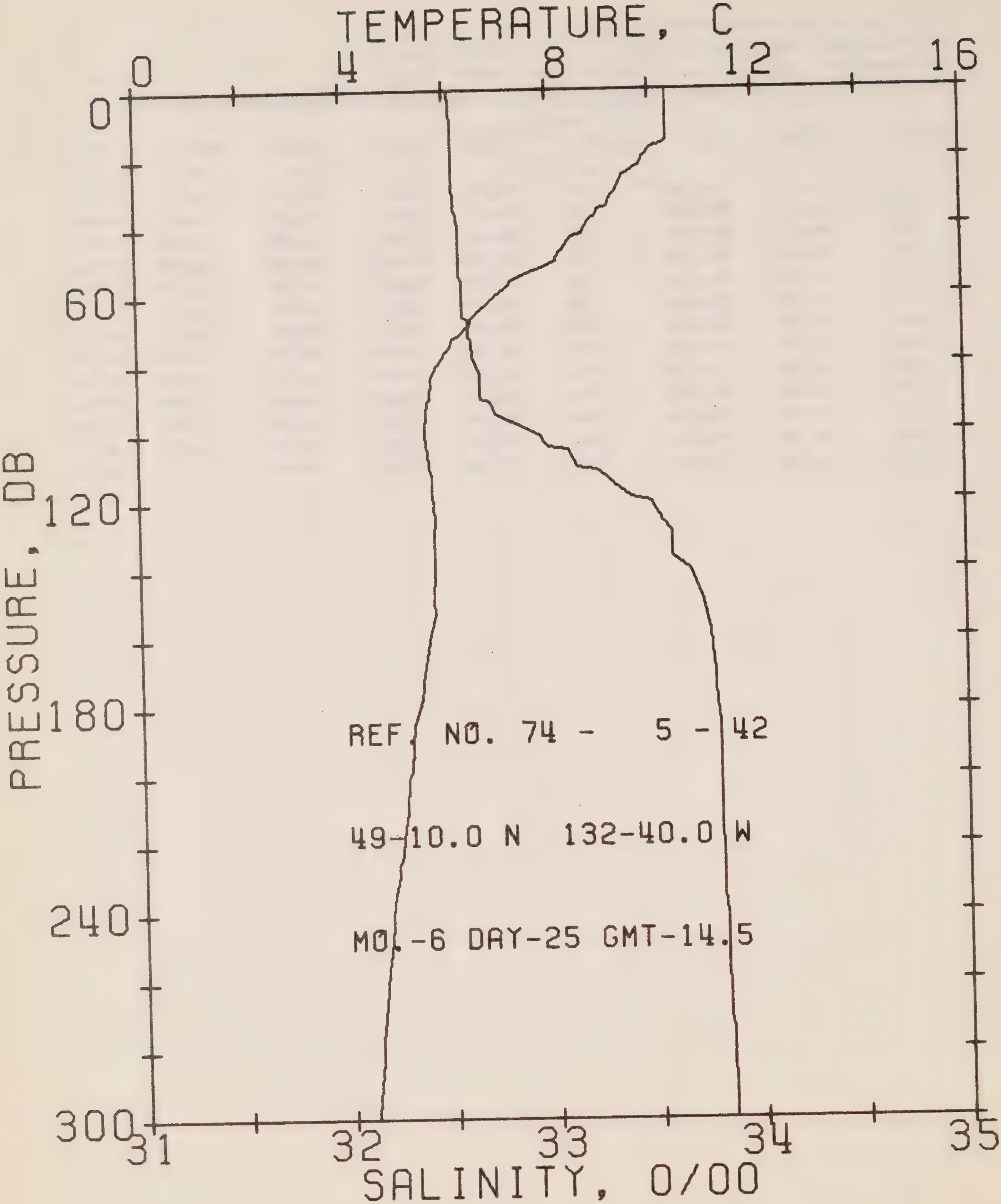
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 74 - 5 - 41
49-17.0 N 134-40.0 W
MO.-6 DAY-25 GMT-8.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 41 DATE 25/ 6/74
POSITION 49-17.0N, 134-40.0W GMT 8.5
RESULTS OF STP CAST 104 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	10.19	32.56	0	25.04	292.8	0.0	0.0	1488.
10	10.15	32.56	10	25.05	292.6	0.29	0.01	1488.
20	9.17	32.56	20	25.21	277.6	0.58	0.06	1485.
30	8.97	32.56	30	25.24	274.7	0.86	0.13	1484.
50	7.15	32.62	50	25.55	245.2	1.38	0.34	1477.
75	5.62	32.69	75	25.80	221.6	1.96	0.71	1472.
100	5.61	32.99	99	26.04	199.3	2.49	1.18	1472.
125	5.72	33.47	124	26.40	164.9	2.95	1.70	1474.
150	5.55	33.70	149	26.61	146.0	3.33	2.24	1474.
175	5.40	33.81	174	26.71	136.3	3.69	2.83	1474.
200	5.21	33.84	199	26.76	132.2	4.02	3.47	1474.
225	4.86	33.86	223	26.81	127.1	4.35	4.17	1473.
250	4.68	33.86	248	26.83	125.3	4.66	4.93	1472.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4
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12
16
PRESSURE, DB
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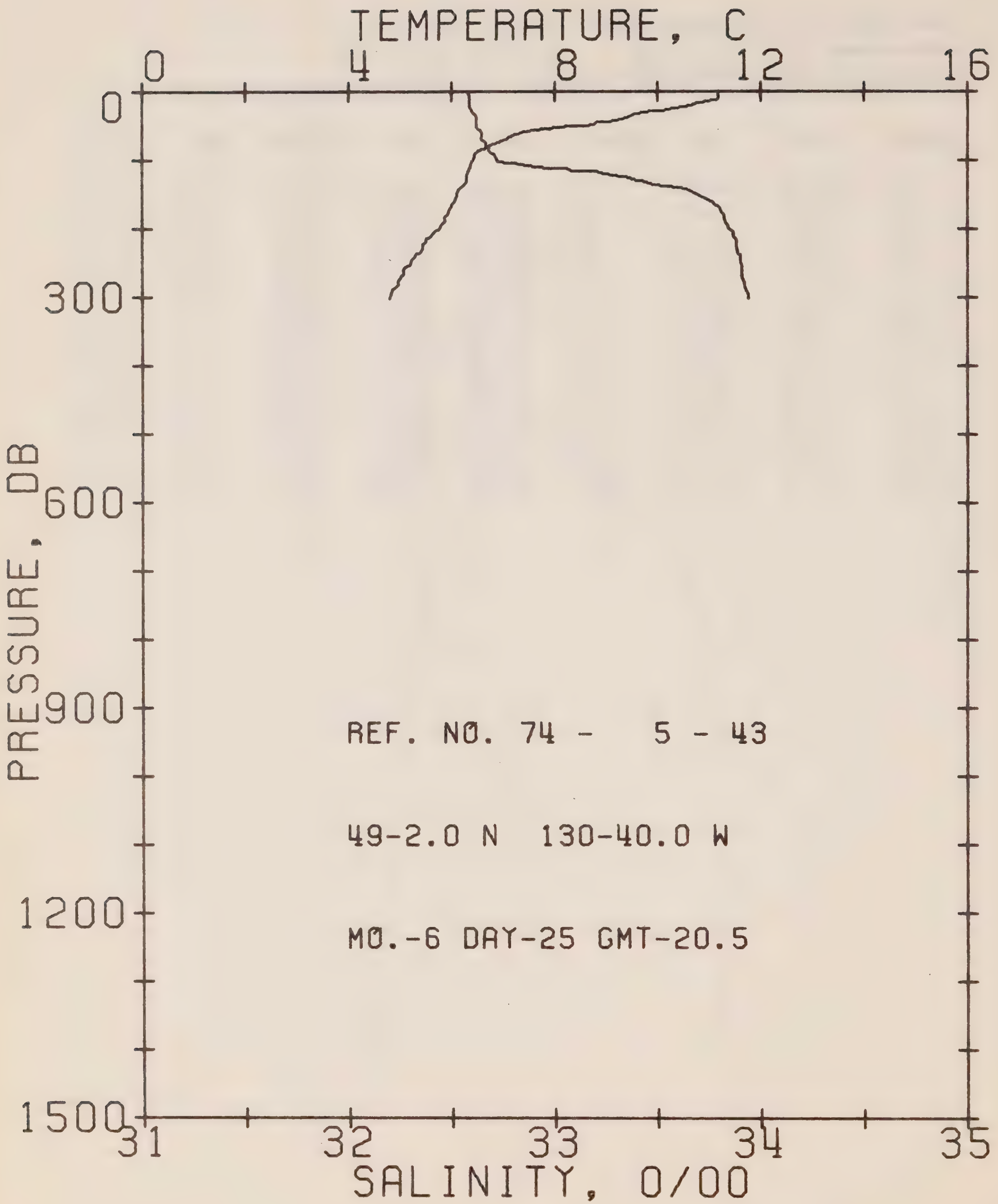
60
120
180
240
300
REF. NO. 74 - 5 - 42
49-10.0 N 132-40.0 W
MO. -6 DAY-25 GMT-14.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 42 DATE 25/ 6/74
POSITION 49-10.0N, 132-40.0W GMT 14.5
RESULTS OF STP CAST 97 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	10.38	32.53	0	24.99	298.1	0.0	0.0	1489.
10	10.38	32.54	10	24.99	297.8	0.30	0.02	1489.
20	9.91	32.54	20	25.07	290.4	0.59	0.06	1487.
30	9.34	32.54	30	25.17	281.6	0.88	0.13	1485.
50	8.20	32.57	50	25.36	263.2	1.42	0.35	1481.
75	6.10	32.62	75	25.69	232.5	2.03	0.74	1474.
100	5.59	32.92	99	25.99	204.3	2.59	1.24	1472.
125	5.77	33.53	124	26.45	161.1	3.04	1.76	1474.
150	5.73	33.73	149	26.61	146.1	3.43	2.29	1475.
175	5.48	33.78	174	26.68	139.3	3.78	2.88	1474.
200	5.19	33.80	199	26.73	134.9	4.12	3.53	1473.
225	4.98	33.80	223	26.75	132.6	4.46	4.26	1473.
250	4.76	33.81	248	26.78	129.9	4.79	5.05	1473.
300	4.48	33.84	298	26.84	125.0	5.42	6.83	1472.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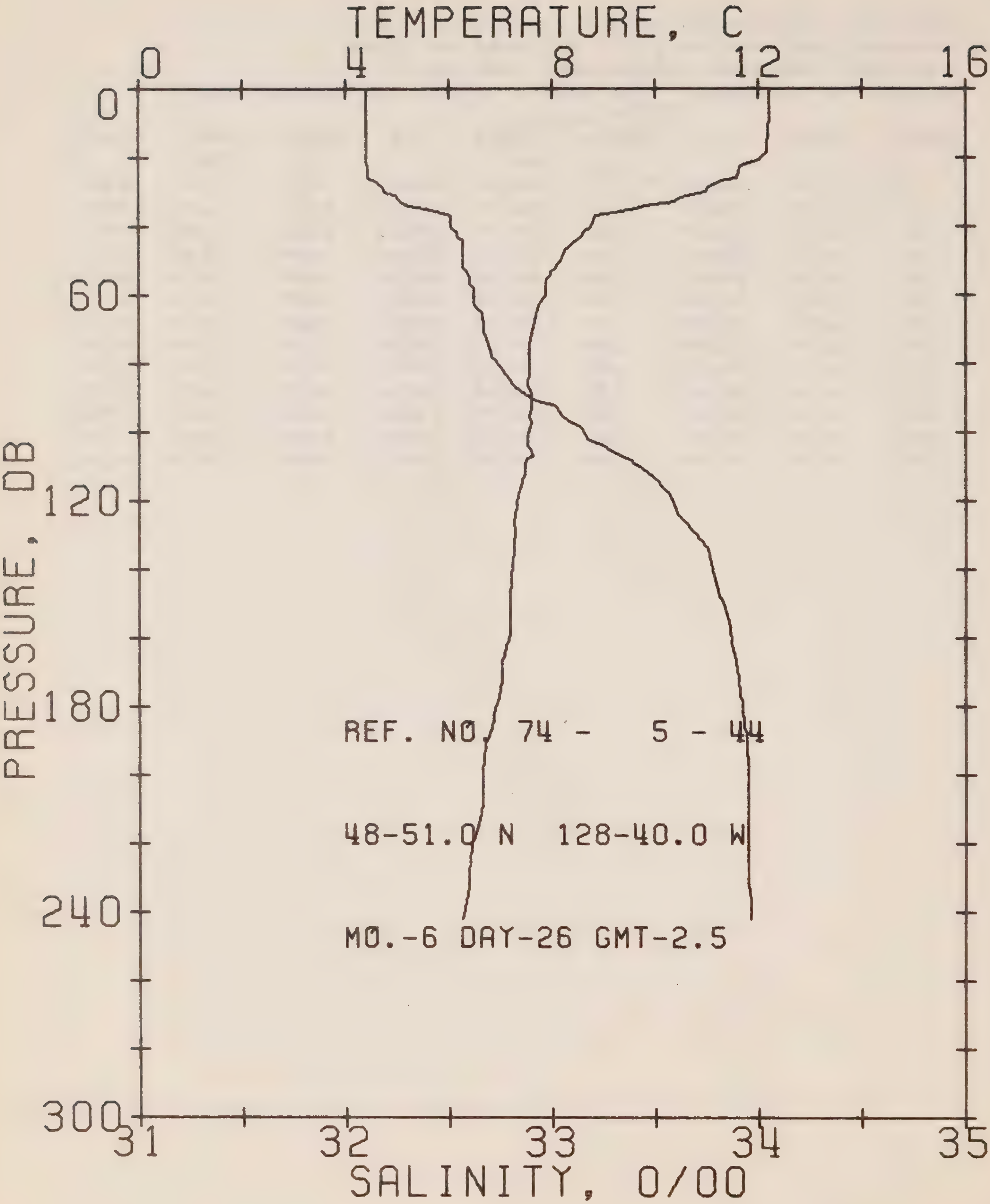
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 74 - 5 - 43
49-2.0 N 130-40.0 W
MO.-6 DAY-25 GMT-20.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 43 DATE 25/ 6/74
POSITION 49- 2.0N, 130-40.0W GMT 20.5
RESULTS OF STP CAST 104 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	11.21	32.58	0	24.88	308.1	0.0	0.0	1492.
10	11.20	32.59	10	24.89	307.7	0.31	0.02	1492.
20	10.67	32.59	20	24.98	299.0	0.61	0.06	1490.
30	9.73	32.60	30	25.15	283.1	0.90	0.14	1487.
50	8.34	32.62	50	25.38	261.4	1.45	0.36	1482.
75	6.87	32.66	75	25.62	238.7	2.07	0.75	1477.
100	6.46	32.72	99	25.72	229.7	2.65	1.27	1476.
125	6.34	33.35	124	26.23	181.5	3.17	1.86	1475.
150	6.16	33.68	149	26.52	154.5	3.58	2.44	1476.
175	5.99	33.81	174	26.64	143.4	3.95	3.05	1476.
200	5.78	33.85	199	26.70	138.1	4.30	3.73	1476.
225	5.47	33.87	223	26.75	133.0	4.64	4.45	1475.
250	5.25	33.89	248	26.79	129.3	4.97	5.25	1475.



TEMPERATURE, C
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8
12
16
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60
120
180
240
300
PRESSURE, DB
REF. NO. 74 - 5 - 44
48-51.0 N 128-40.0 W
MO.-6 DAY-26 GMT-2.5
31
32
33
34
35
SALINITY, 0/00

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 44 DATE 26/ 6/74
POSITION 48-51.0N, 128-40.0W GMT 2.5
RESULTS OF STP CAST 107 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	DELTA D	POT. EN	SOUND
0	12.24	32.10	0	24.32	361.6	0.0	0.0	1495.
10	12.23	32.10	10	24.32	361.8	0.36	0.02	1495.
20	12.11	32.10	20	24.34	359.9	0.72	0.07	1495.
30	10.99	32.19	30	24.62	334.1	1.07	0.16	1491.
50	8.21	32.57	50	25.36	263.3	1.64	0.39	1481.
75	7.59	32.69	75	25.55	245.7	2.27	0.79	1480.
100	7.57	33.15	99	25.91	212.1	2.85	1.31	1480.
125	7.31	33.62	124	26.32	173.5	3.33	1.85	1480.
150	7.21	33.82	149	26.49	157.7	3.74	2.42	1481.
175	7.03	33.91	174	26.58	149.6	4.12	3.06	1481.
200	6.68	33.95	199	26.66	142.1	4.48	3.75	1480.
225	6.43	33.94	223	26.68	140.0	4.84	4.52	1479.

BATHYTHERMOGRAPH OBSERVATIONS

(P-74-5)

BATHYTHERMOGRAPH OBSERVATIONS

This section includes all B.T.'s taken on Line P outbound and inbound, and one a day on station P .

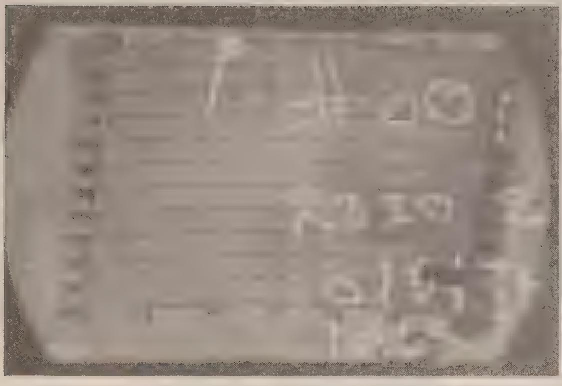
Although B.T.'s at station P were taken every 3 hours, only the one taken at 1800 GMT has been shown.

Weather conditions on Line P sometimes forces the cancellation of a B.T., in that case an X.B.T. was taken. These X.B.T.'s are shown following the B.T.'s.

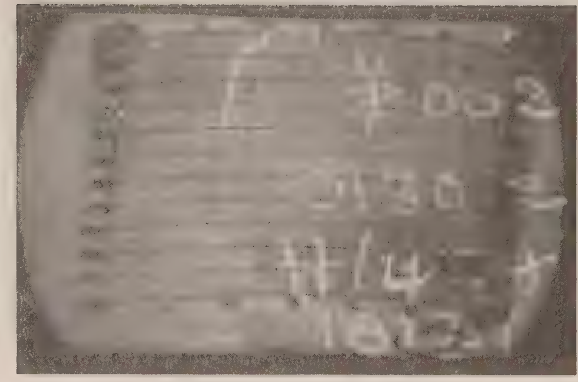
EXPLANATION OF HEADINGS

Example: 0030/ 13-04-74
48° 34' N.
125° 30' W.

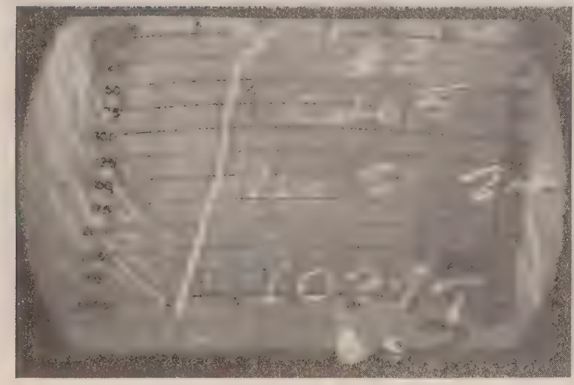
0030 = Time in GMT
13 = Day
04 = Month
74 = Year
48° 34' N. = Latitude
125° 30' W. = Longitude



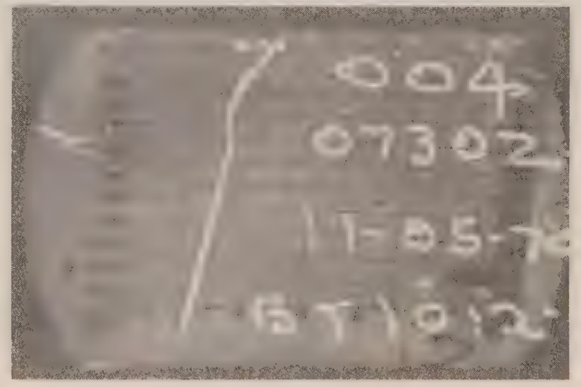
2330 / 10-05-74
48° 33' N.
125° 33' W.



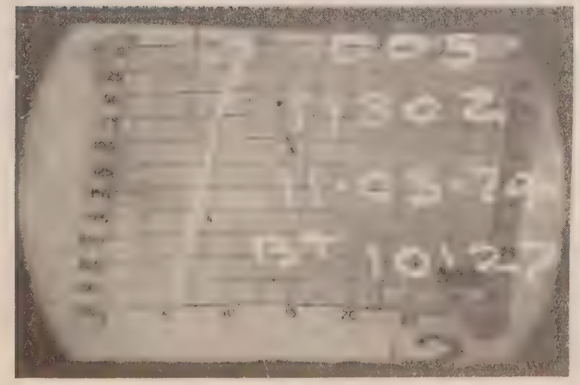
0130 / 11-05-74
48° 38' N.
126° 00' W.



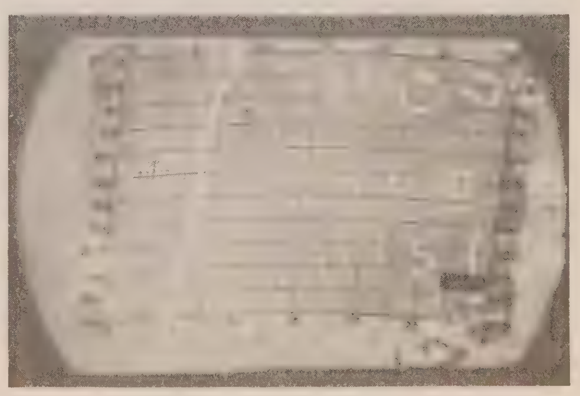
0405 / 11-05-74
48° 42' N.
126° 40' W.



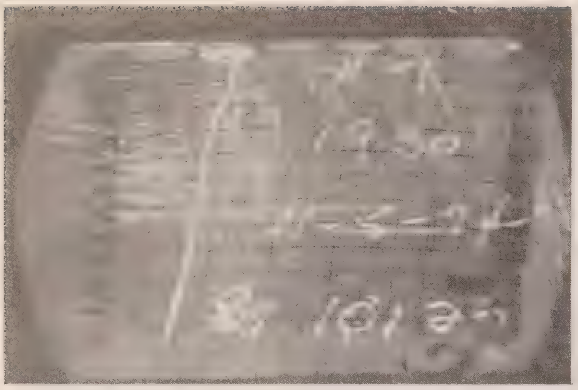
0730 / 11-05-74
48° 46' N.
127° 40' W.



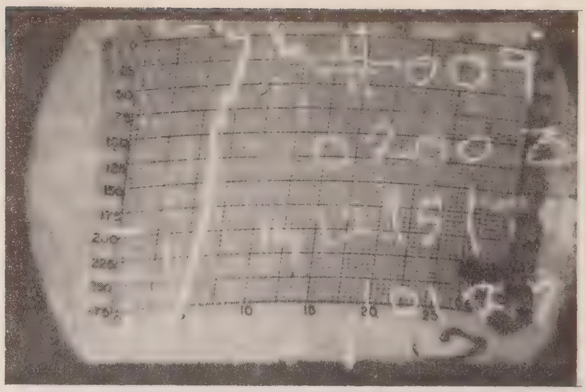
1130 / 11-05-74
48° 52' N.
128° 40' W.



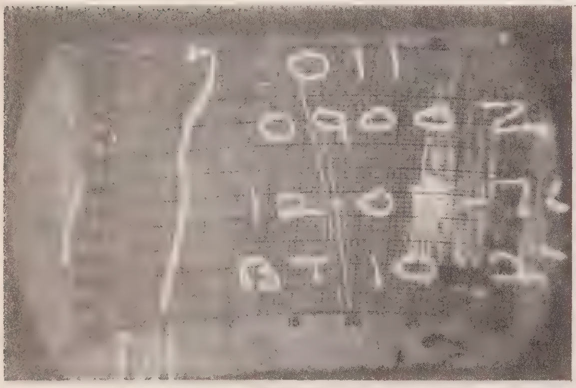
1600 / 11-05-74
48° 56' N.
129° 40' W.



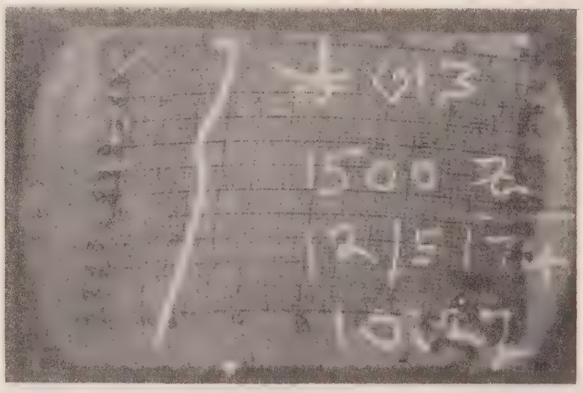
1930 / 11-05-74
49° 02' N.
130° 40' W.



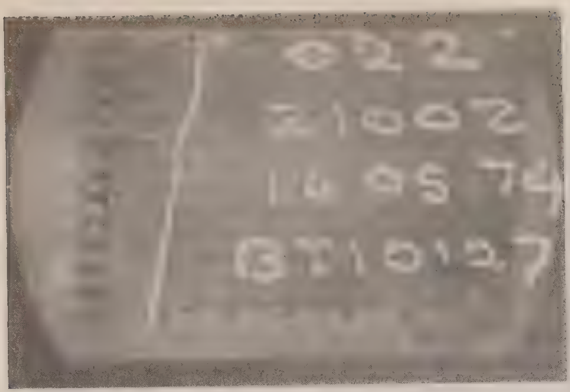
0200 / 12-05-74
49° 10' N.
132° 40' W.



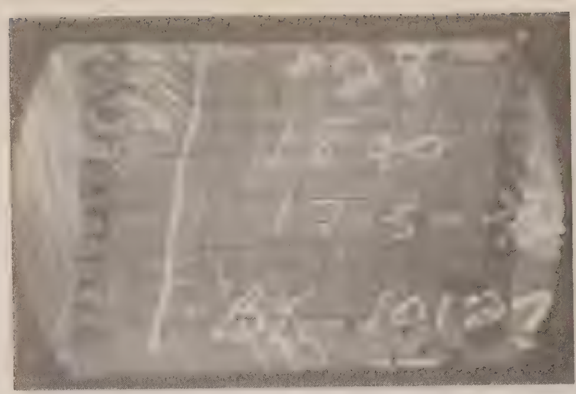
0900 / 12-05-74
49° 16' N.
134° 40' W.



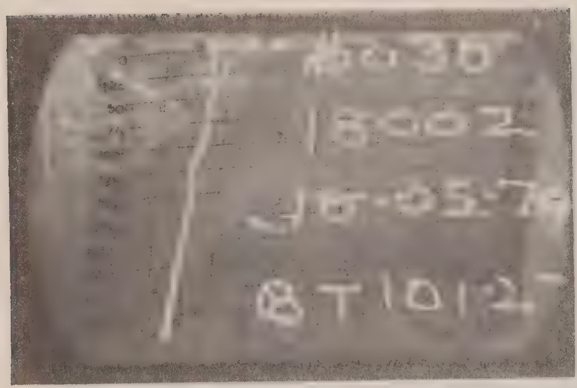
1500 / 12-05-74
49° 26' N.
136° 40' W.



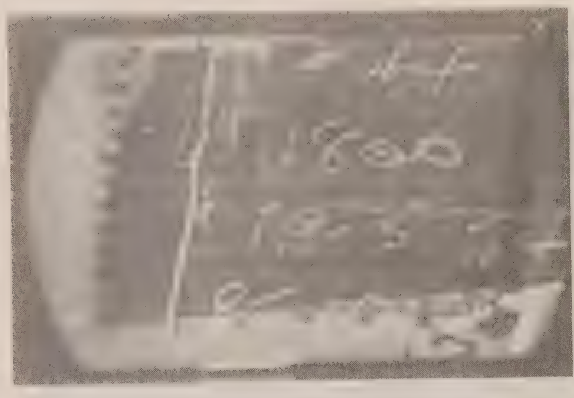
2100 / 16-05-74
49° 55' N.
144° 55' W.



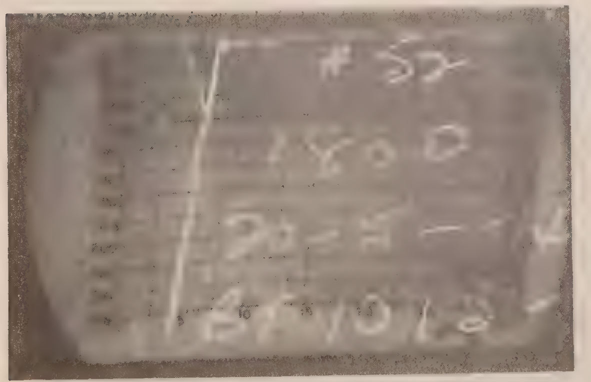
1800 / 17-05-74
50° 00' N.
145° 02' W.



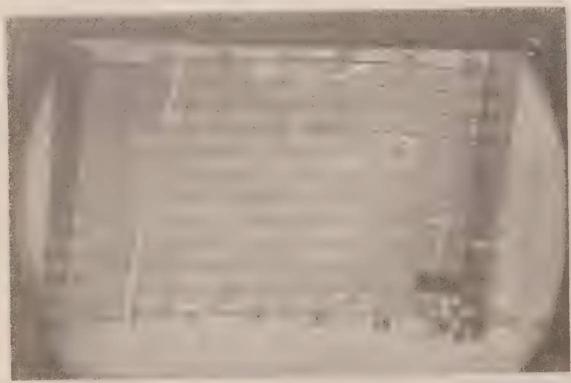
1800 / 18-05-74
49° 56' N.
144° 58' W.



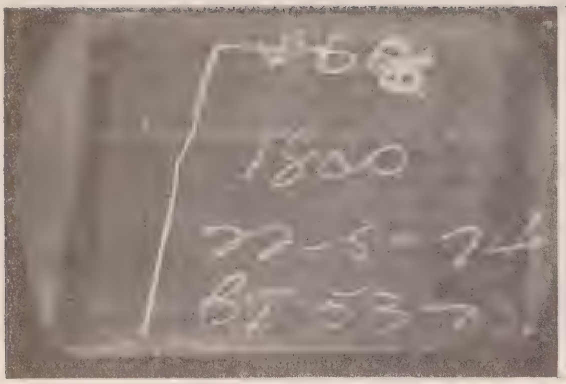
1800 / 19-05-74
50° 05' N.
144° 58' W.



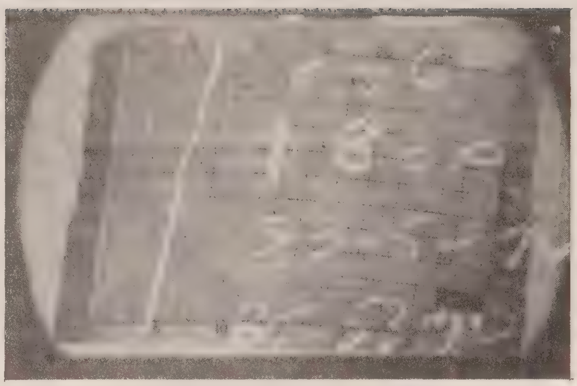
1800 / 20-05-74
50° 01' N.
144° 58' W.



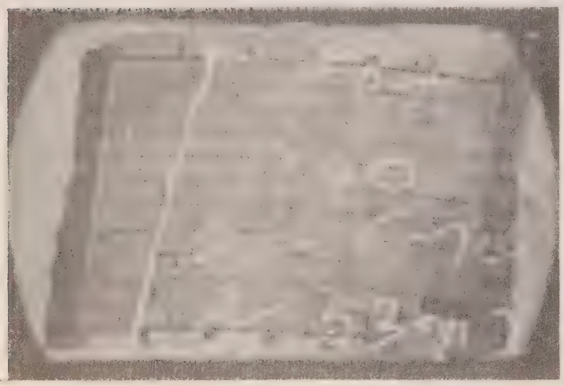
1800 / 21-05-74
50° 00' N.
144° 58' W.



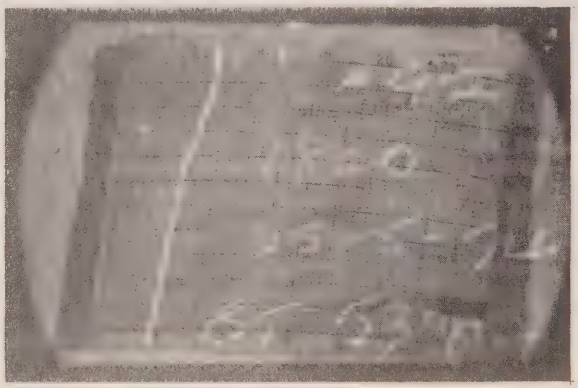
1800 / 22-05-74
49° 59' N.
145° 00' W.



1800 / 23-05-74
50° 01' N.
144° 58' W.

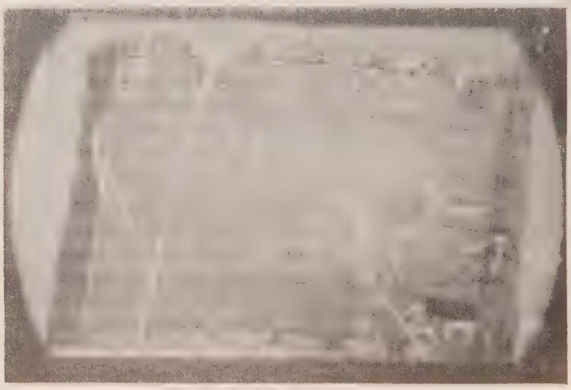


1800 / 24-05-74
50° 05' N.
144° 49' W.



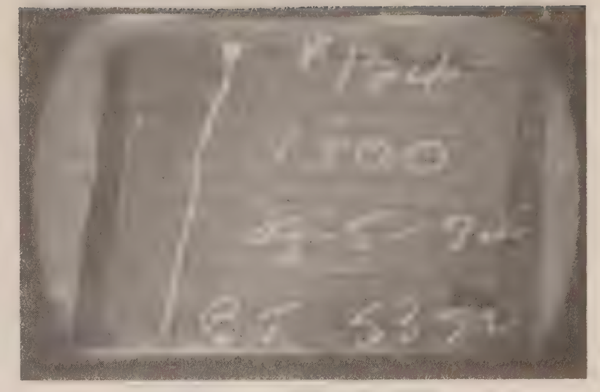
1800 / 25-05-74
50° 00' N.
145° 03' W.

1800 / 26-05-74
49° 58' N.
144° 57' W.

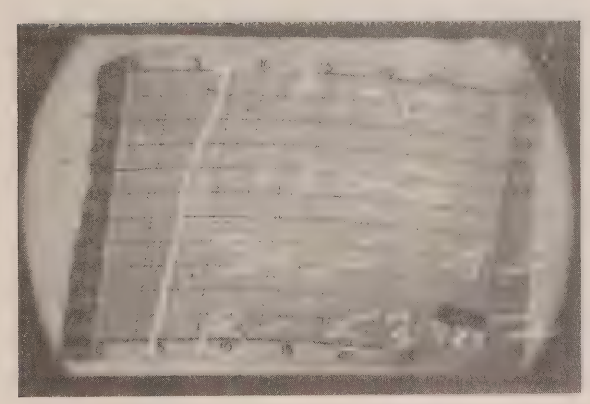


1800 / 27-05-74
49° 59' N.
145° 00' W.

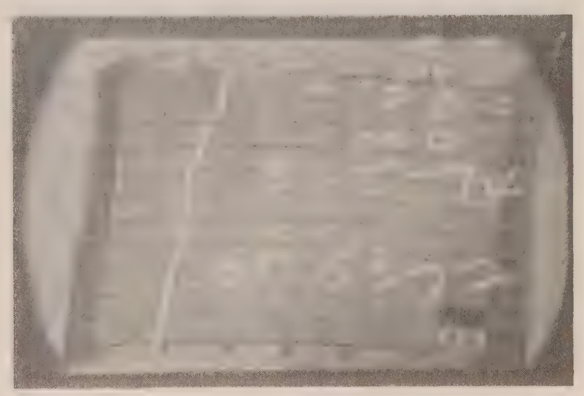
1800 / 28-05-74
49° 58' N.
144° 57' W.



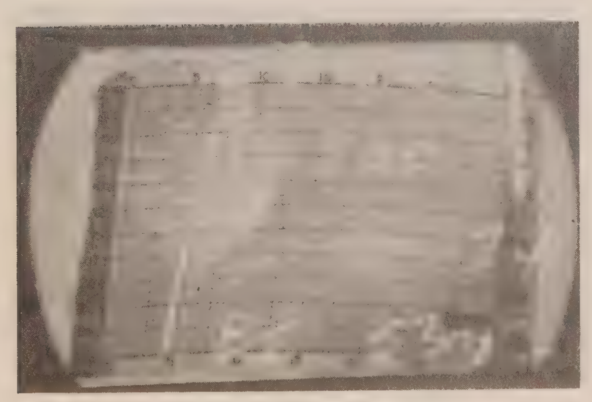
1800 / 29-05-74
50° 01' N.
144° 56' W.



1800 / 30-05-74
49° 58' N.
145° 00' W.

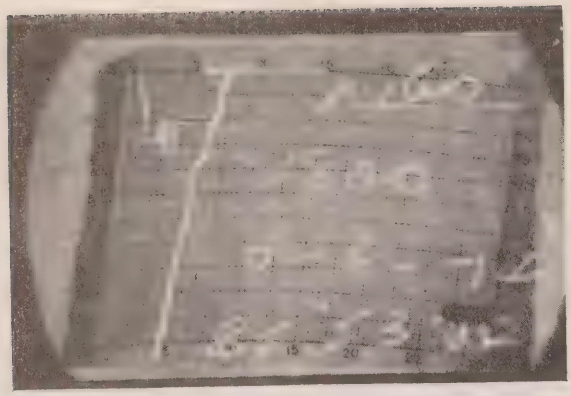


1800 / 31-05-74
49° 59' N.
144° 54' W.



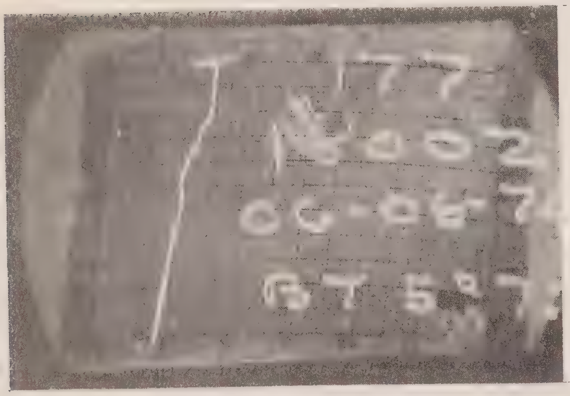
1800 / 01-06-74
49° 58' N.
144° 57' W.

1800 / 02-06-74
49° 58' N.
145° 00' W.

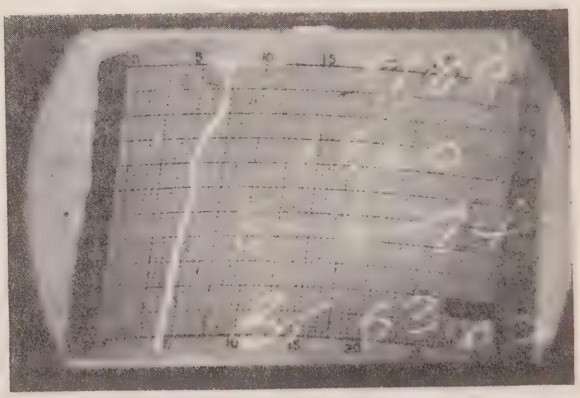


1800 / 03-06-74
49° 58' N.
144° 57' W.

1800 / 04-06-74
49° 58' N.
144° 57' W.

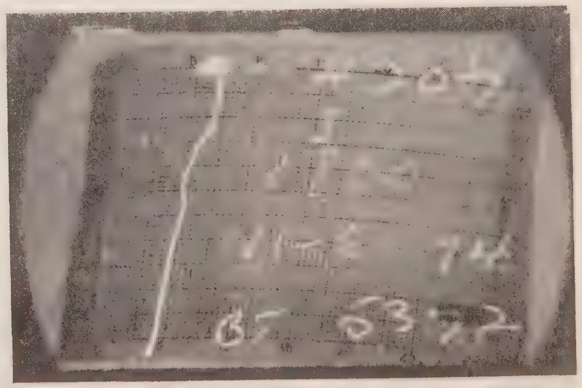


1800 / 06-06-74
50° 00' N.
144° 50' W.

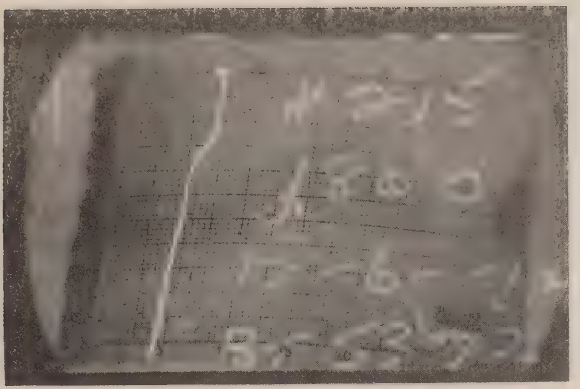


1800 / 08-06-74
49° 58' N.
144° 57' W.

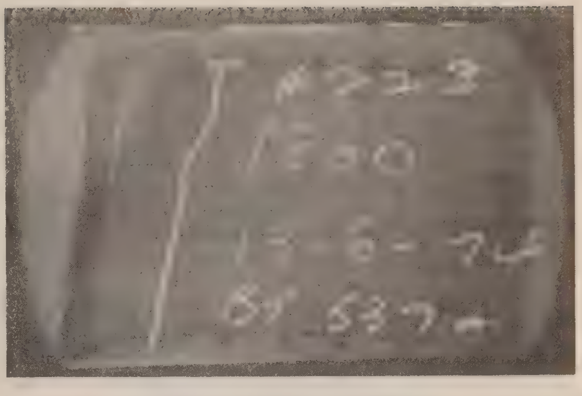
1800 / 10-06-74
49° 57' N.
145° 00' W.



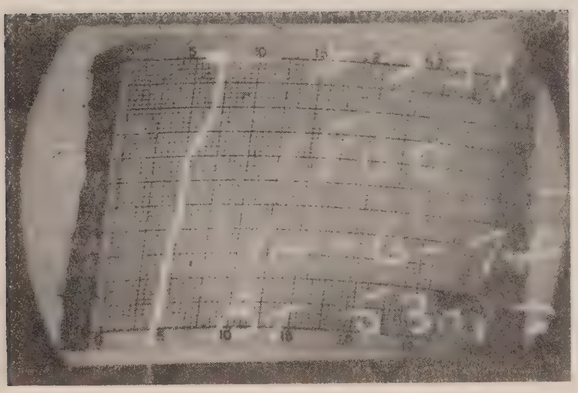
1800 / 11-06-74
49° 57' N.
145° 00' W.



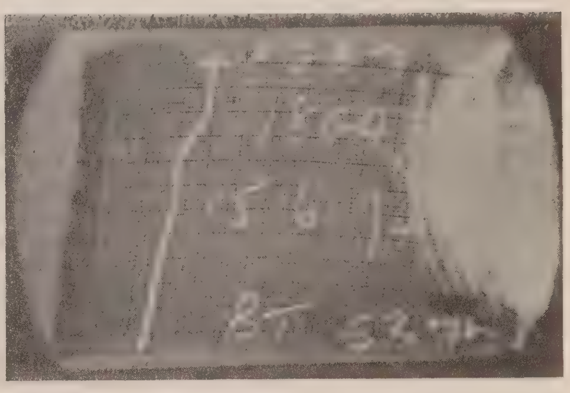
1800 / 12-06-74
49° 58' N.
144° 58' W.



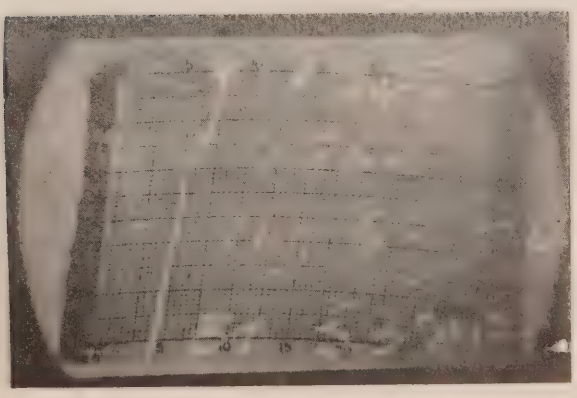
1800 / 13-06-74
49° 57' N.
144° 58' W.



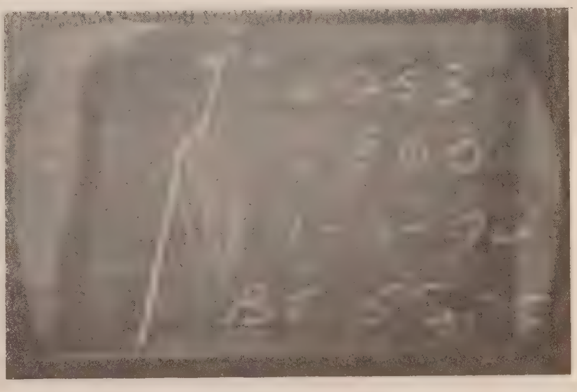
1800 / 14-06-74
49° 58' N.
144° 56' W.



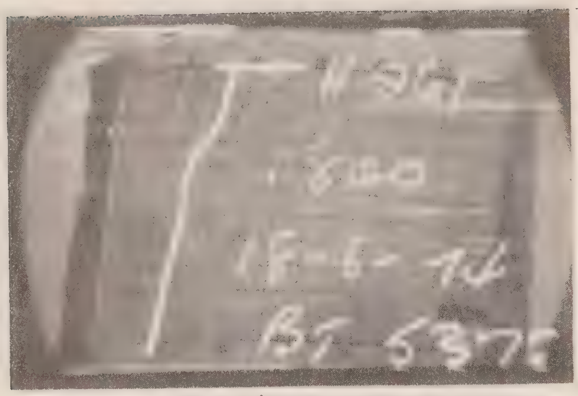
1800 / 15-06-74
49° 57' N.
144° 56' W.



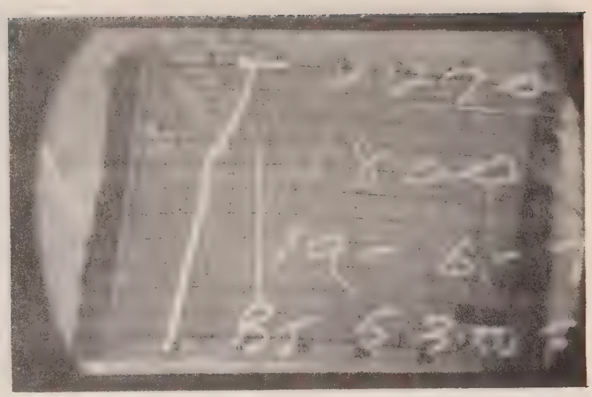
1800 / 16-06-74
49° 58' N.
145° 00' W.



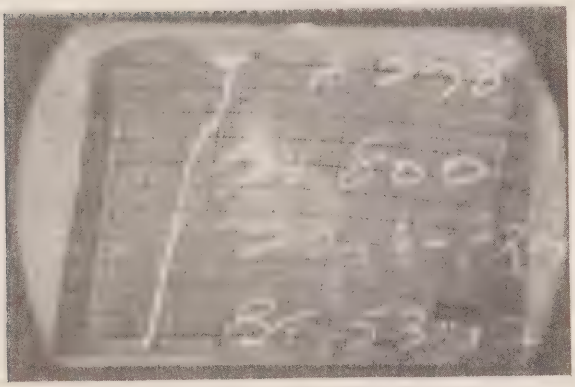
1800 / 17-06-74
49° 58' N.
144° 57' W.



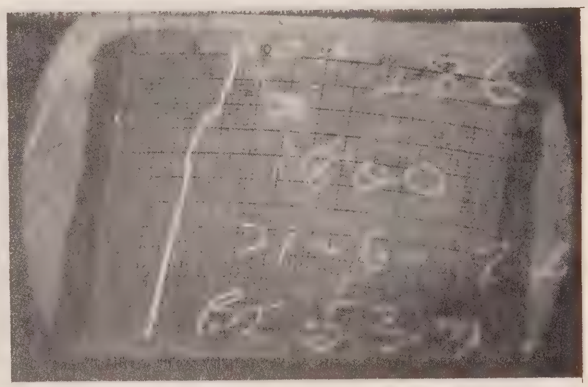
1800 / 18-06-74
49° 56' N.
144° 58' W.



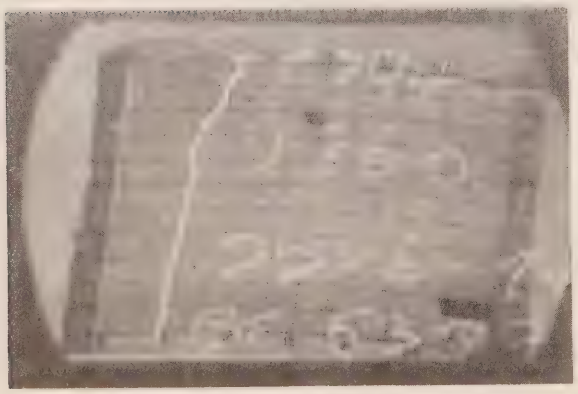
1800 / 19-06-74
49° 59' N.
144° 58' W.



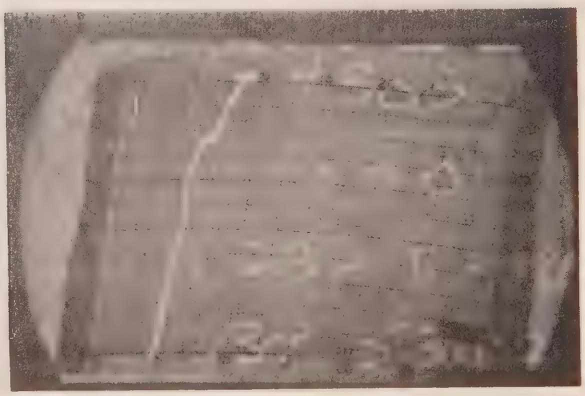
1800 / 20-06-74
49° 58' N.
145° 00' W.



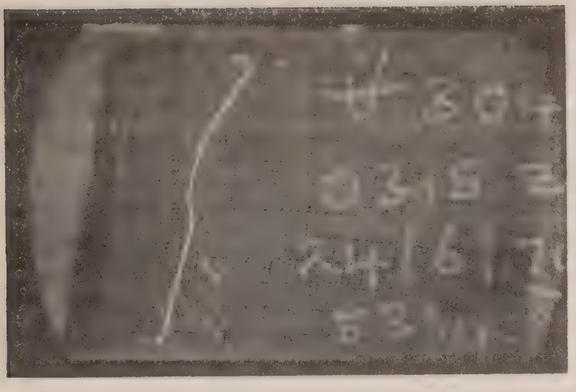
1800 / 21-06-74
50° 00' N.
145° 00' W.



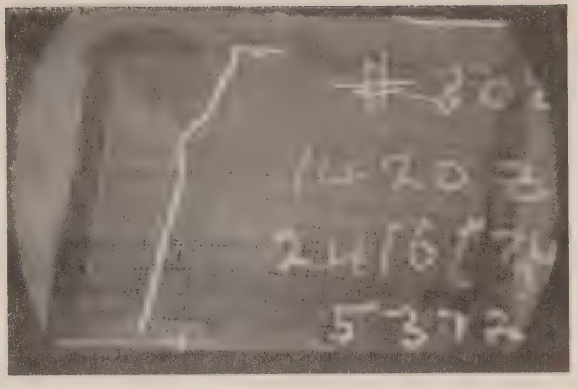
1800 / 22-06-74
50° 00' N.
145° 00' W.



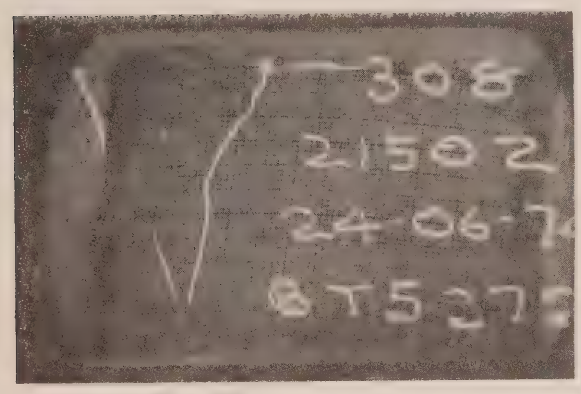
1800 / 23-06-74
49° 58' N.
144° 57' W.



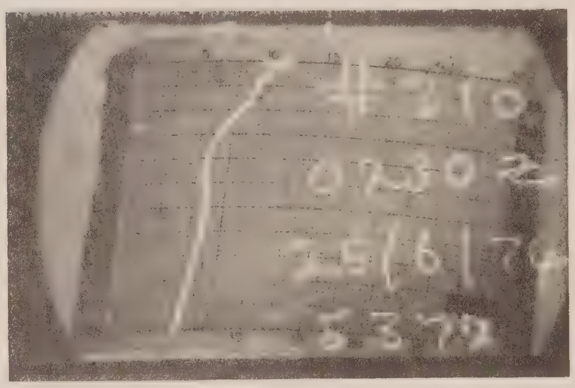
0315 / 24-06-74
49° 49' N.
142° 40' W.



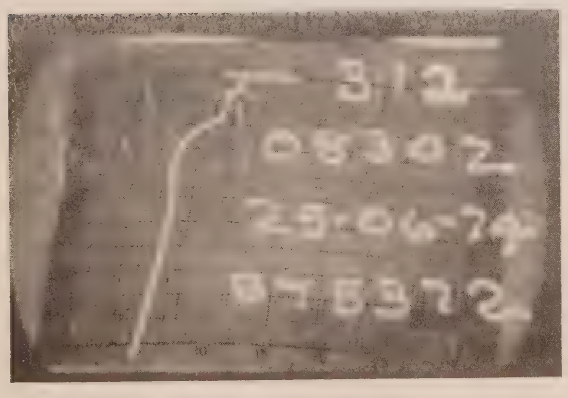
1420 / 24-06-74
49° 41' N.
140° 40' W.



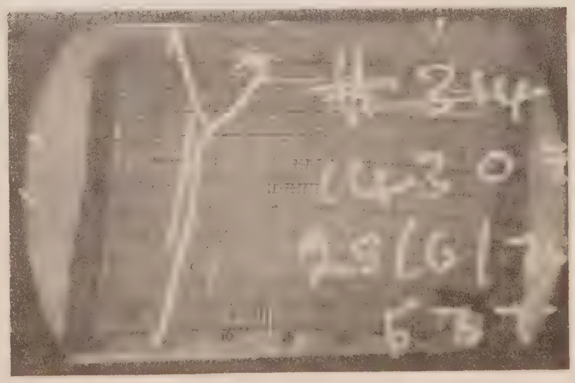
2100 / 24-06-74
49° 34' N.
138° 40' W.



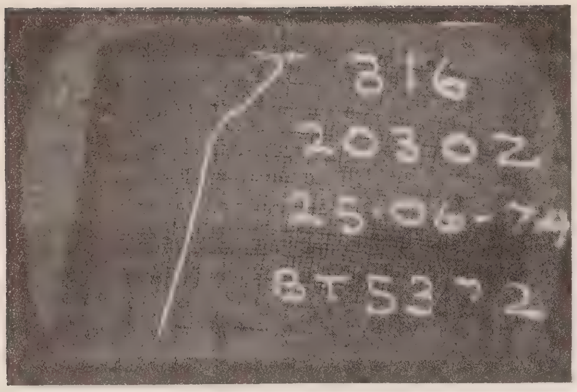
0230 / 25-06-74
49° 26' N.
136° 40' W.



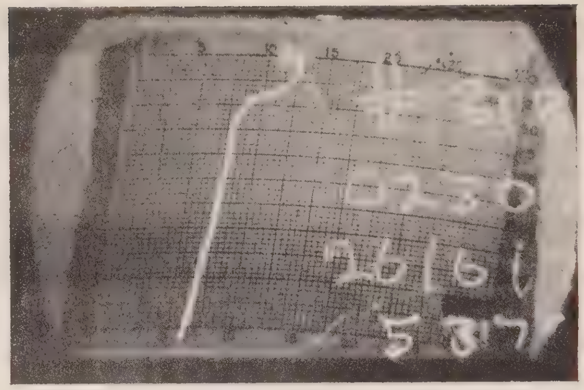
0830 / 25-06-74
49° 17' N.
134° 40' W.



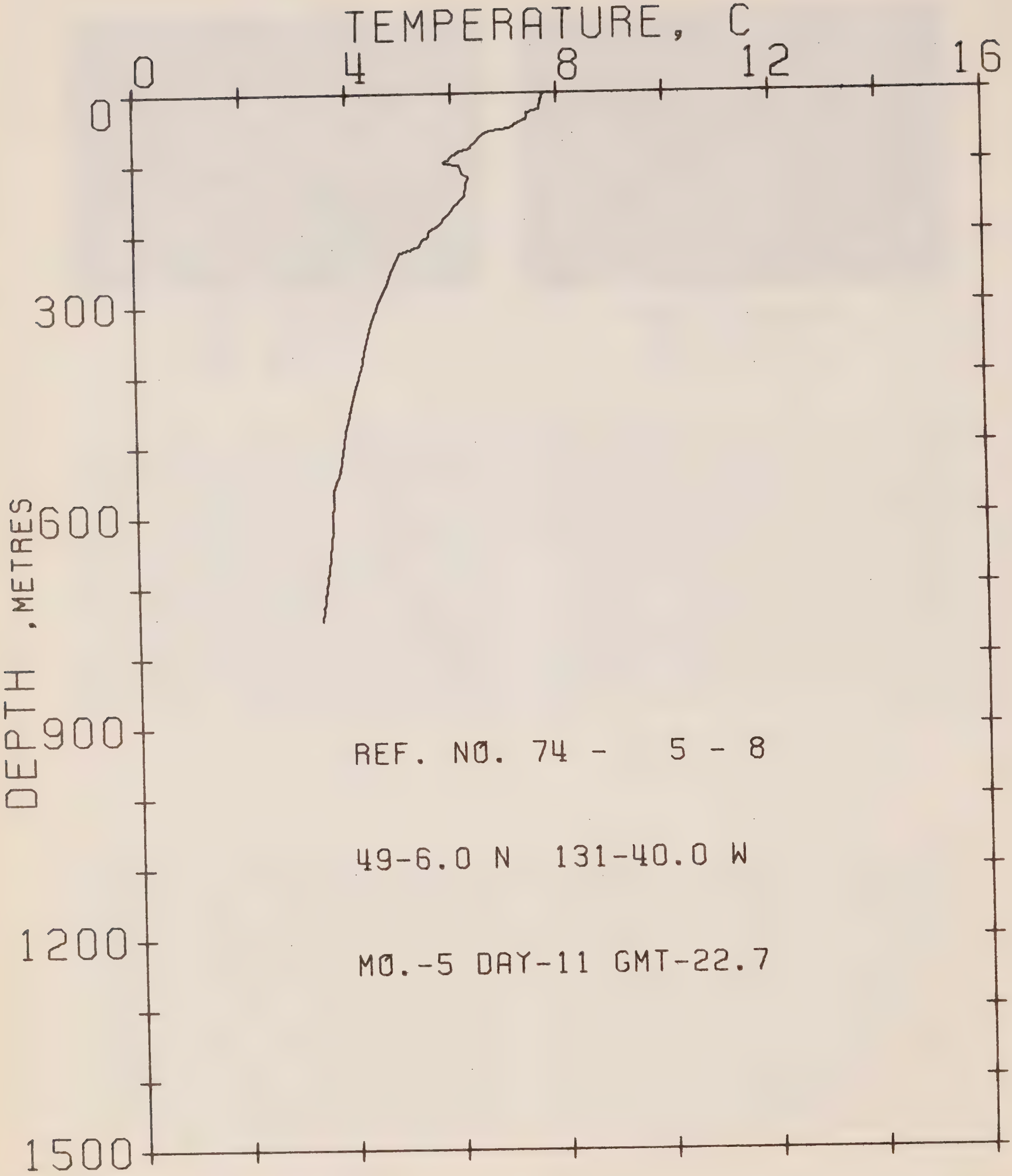
1430 / 25-06-74
49° 10' N.
132° 40' W.



2030 / 25-06-74
49° 02' N.
130° 40' W.

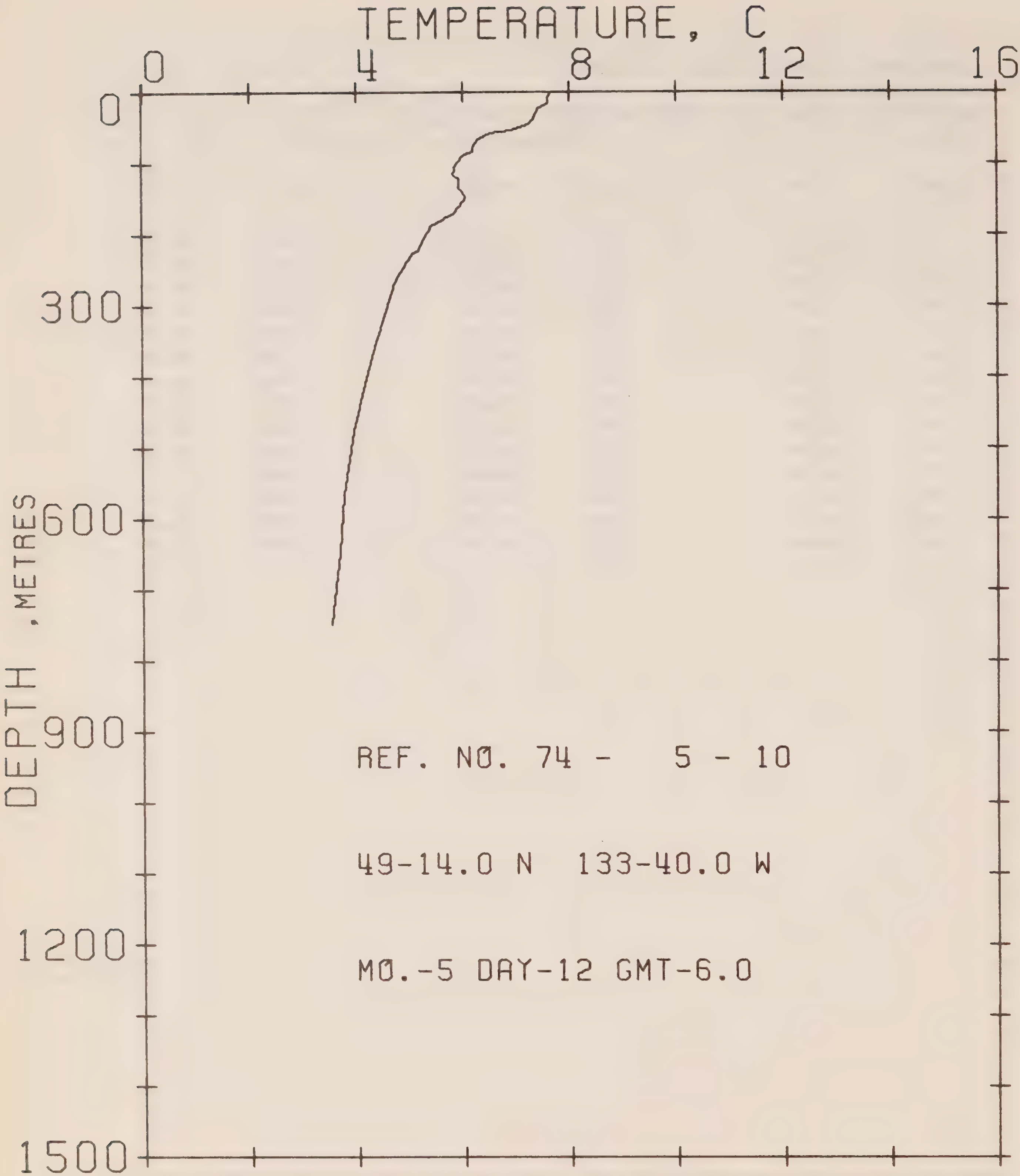


0230 / 26-06-74
48° 51' N.
128° 40' W.


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NO. 74 - 5 - 8
49-6.0 N 131-40.0 W
MO.-5 DAY-11 GMT-22.7

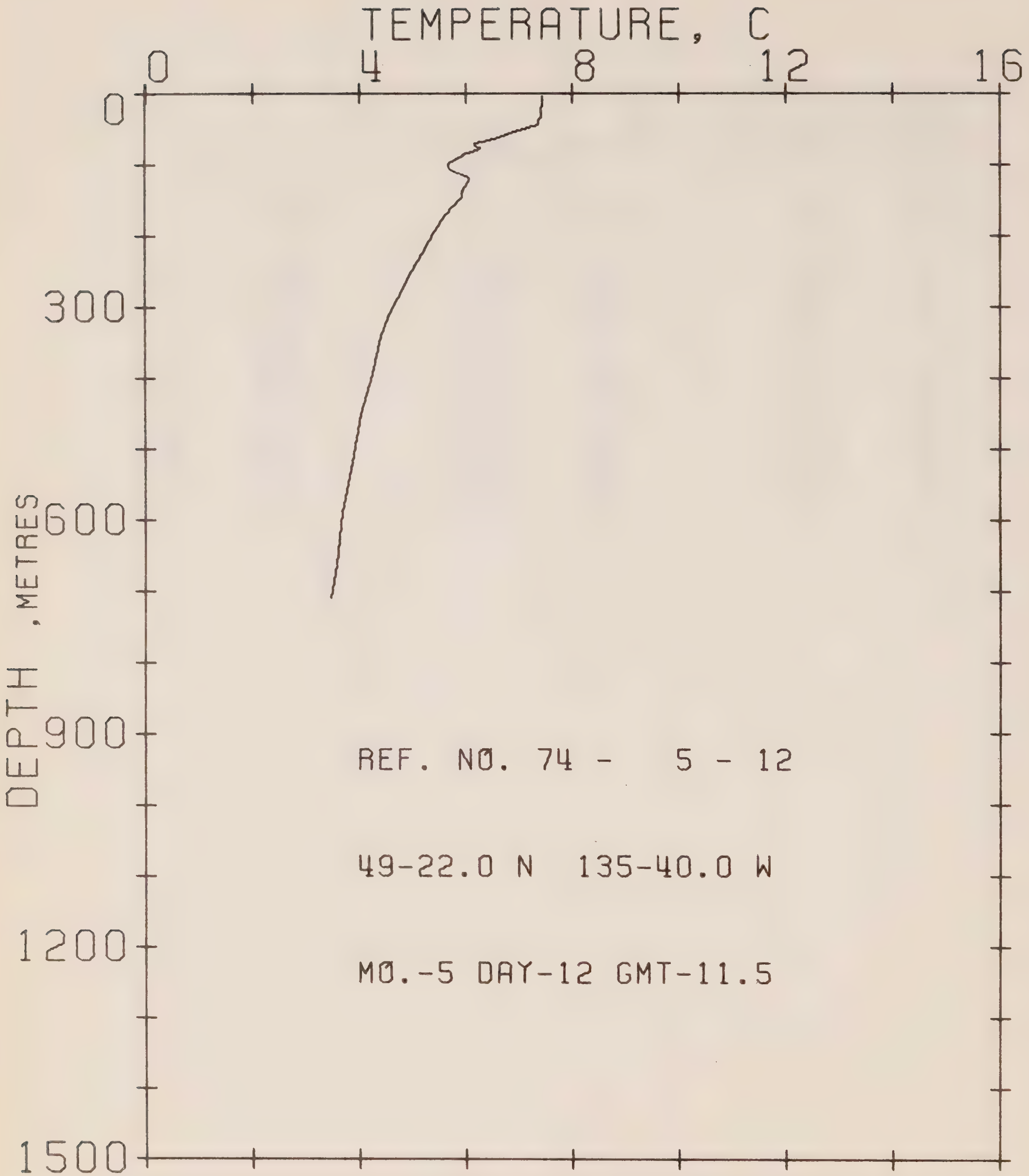
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 8 DATE 11- 5-74
POSITION 49- 6.0N 131-40.0W GMT 22.7
RESULTS OF XBT CAST 43 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
1	7.77	103	6.10	245	4.82
12	7.72	114	6.16	260	4.72
24	7.68	118	6.27	273	4.68
29	7.42	122	6.28	300	4.49
36	7.43	130	6.23	329	4.35
44	7.22	133	6.23	359	4.22
51	7.12	146	6.19	390	4.14
55	6.75	159	6.04	431	3.96
58	6.59	188	5.69	483	3.79
70	6.44	194	5.53	536	3.68
75	6.34	203	5.49	565	3.54
79	6.34	209	5.38	621	3.49
82	6.13	216	5.34	677	3.38
90	5.97	227	4.96	749	3.24
101	5.82				


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NO. 74 - 5 - 10
49-14.0 N 133-40.0 W
MO.-5 DAY-12 GMT-6.0

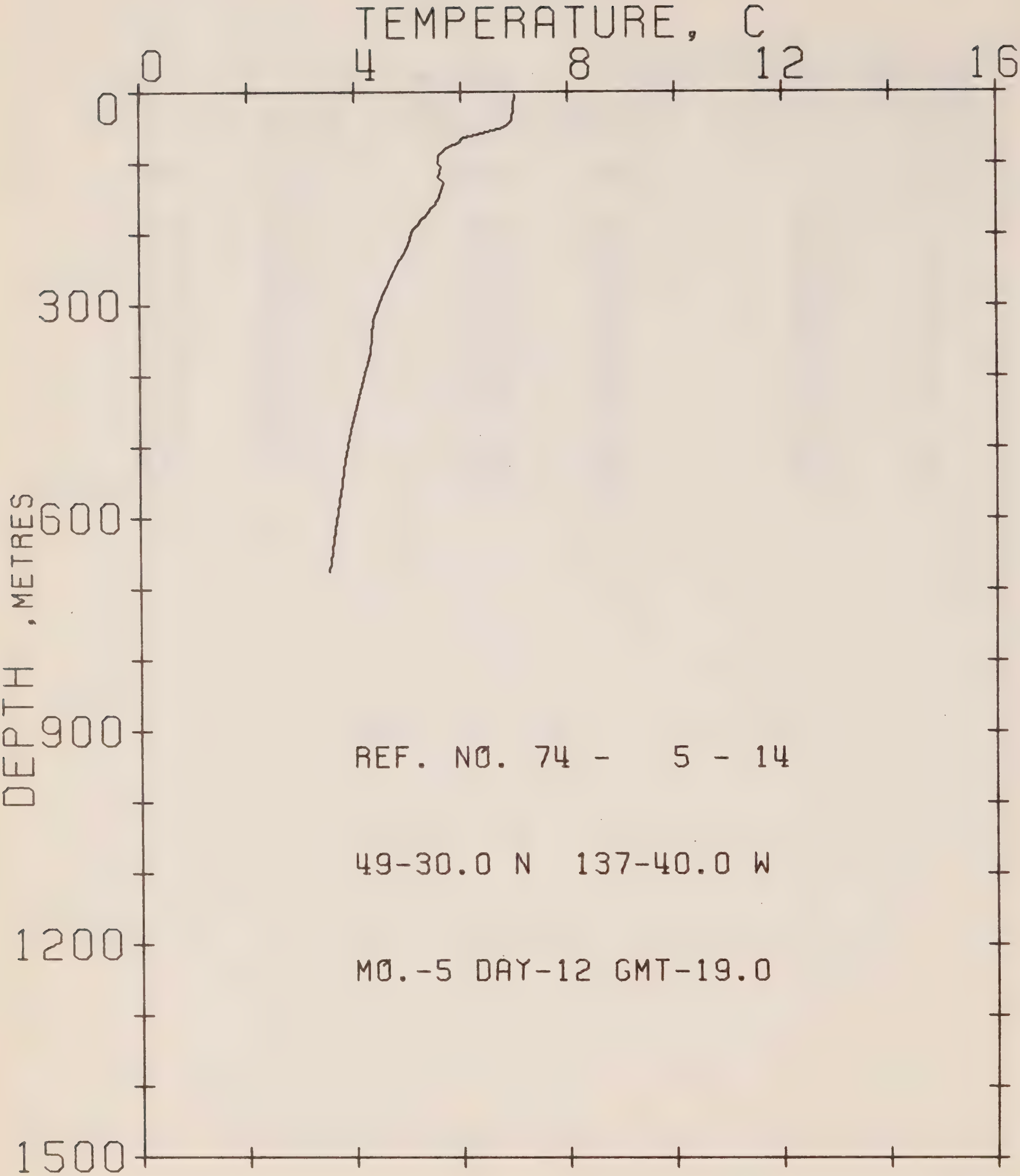
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 10 DATE 12- 5-74
POSITION 49-14.0N 133-40.0W GMT 6.0
RESULTS OF XBT CAST 33 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	7.66	85	6.18	227	5.03
8	7.60	89	6.02	255	4.80
16	7.60	102	5.85	268	4.69
19	7.55	116	5.79	282	4.62
23	7.44	122	5.89	352	4.32
39	7.33	136	5.89	403	4.13
47	7.21	149	6.04	478	3.88
54	6.89	170	5.82	568	3.67
59	6.51	188	5.38	648	3.58
67	6.29	212	5.20	699	3.50
79	6.18	223	5.14	750	3.42


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NO. 74 - 5 - 12
49-22.0 N 135-40.0 W
MO.-5 DAY-12 GMT-11.5

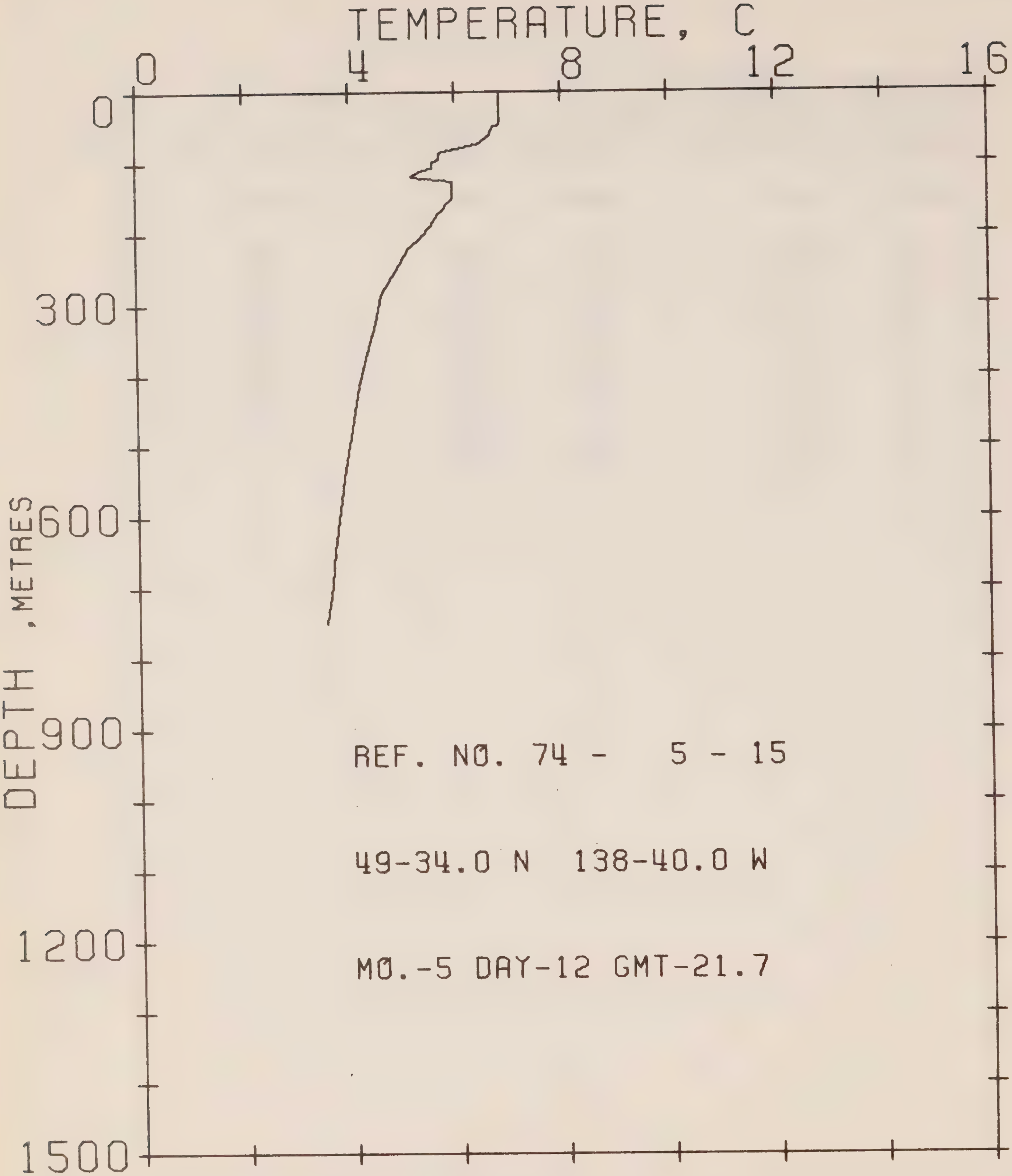
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 12 DATE 12- 5-74
POSITION 49-22.0N 135-40.0W GMT 11.5
RESULTS OF XBT CAST 35 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	7.34	96	5.60	250	4.88
34	7.32	103	5.55	274	4.74
38	7.27	109	5.61	306	4.50
44	7.27	114	5.83	343	4.31
55	6.80	118	5.95	397	4.15
64	6.43	124	5.95	452	3.93
70	6.06	134	5.85	521	3.78
74	6.07	146	5.81	590	3.57
77	6.18	159	5.66	665	3.48
79	6.18	172	5.51	710	3.36
87	5.86	195	5.32	751	3.35
89	5.86	225	5.07		


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NO. 74 - 5 - 14
49-30.0 N 137-40.0 W
MO.-5 DAY-12 GMT-19.0

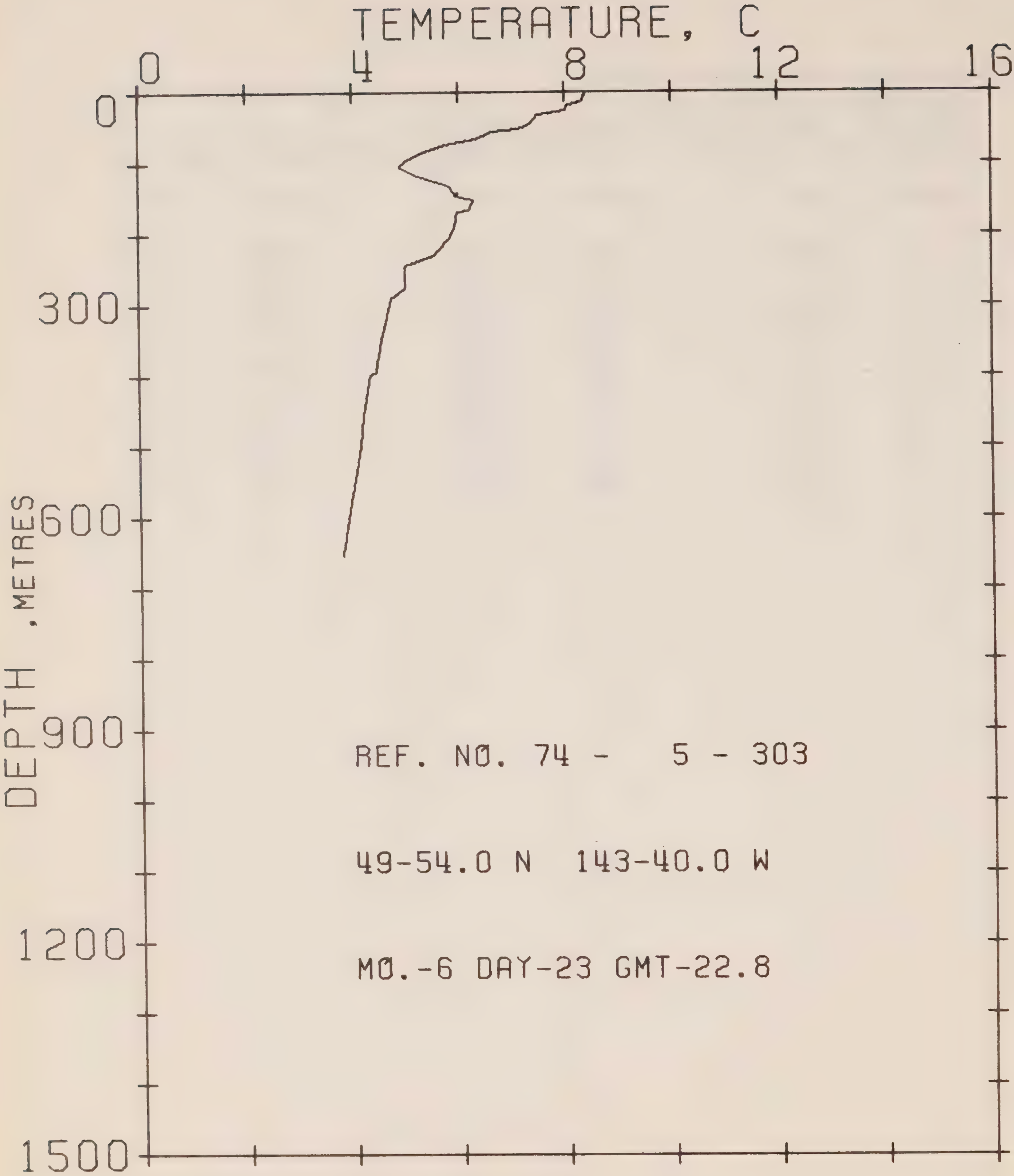
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 14 DATE 12- 5-74
POSITION 49-30.0N 137-40.0W GMT 19.0
RESULTS OF XBT CAST 29 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
4	6.91	103	5.47	322	4.24
41	6.87	106	5.53	368	4.20
44	6.81	121	5.47	412	4.04
50	6.71	129	5.58	478	3.83
56	6.38	152	5.48	521	3.72
63	6.06	173	5.26	552	3.67
66	5.90	195	4.99	618	3.52
71	5.90	221	4.89	675	3.42
79	5.63	247	4.67	751	3.37
90	5.47	291	4.40		


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NØ. 74 - 5 - 15
49-34.0 N 138-40.0 W
MØ.-5 DAY-12 GMT-21.7

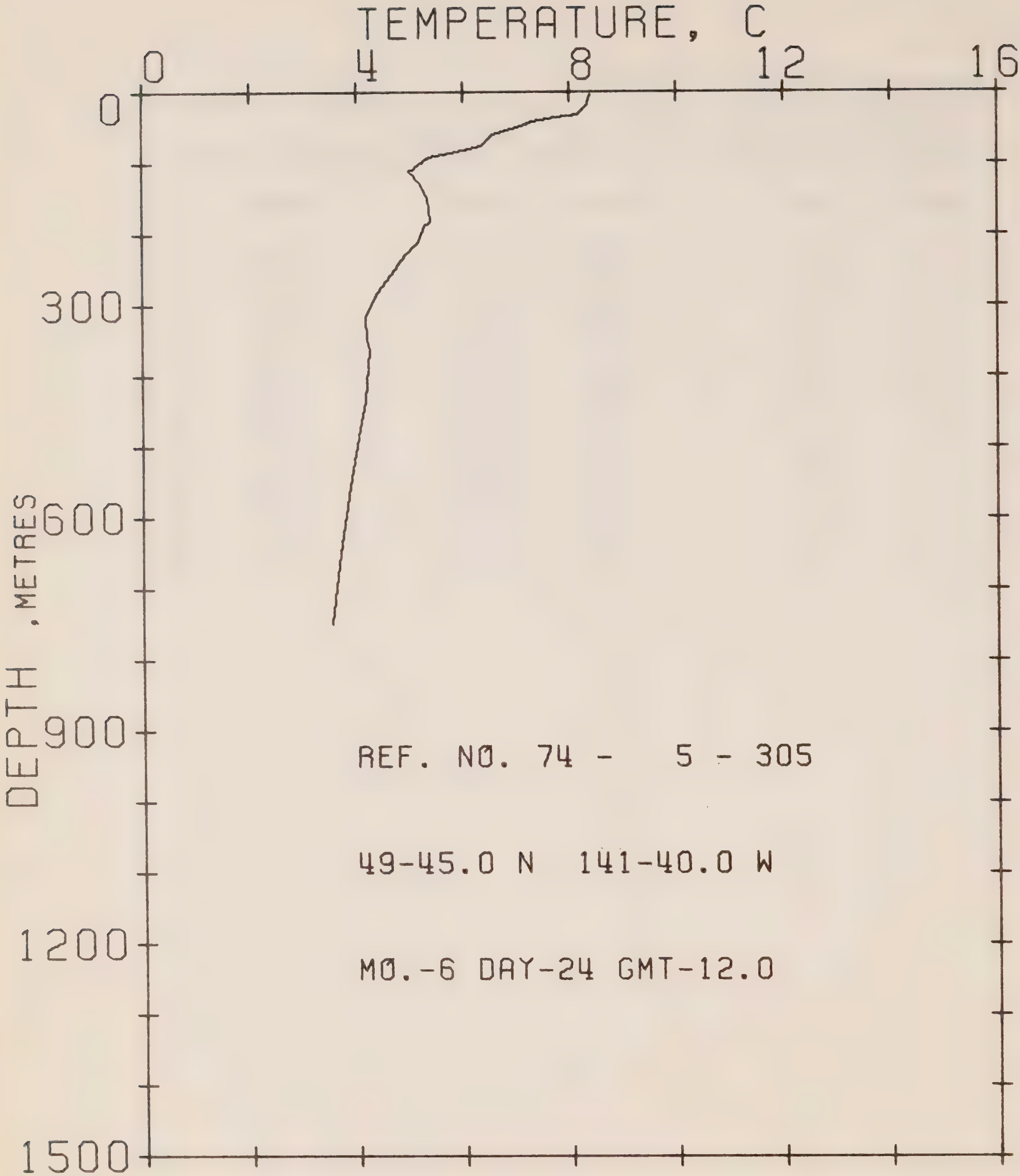
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5- 15 DATE 12- 5-74
POSITION 49-34.0N 138-40.0W GMT 21.7
RESULTS OF XBT CAST 34 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
1	6.75	108	5.46	255	4.76
18	6.75	111	5.30	286	4.49
46	6.76	118	5.08	327	4.38
48	6.65	119	5.08	369	4.22
62	6.54	120	5.08	417	4.06
74	6.33	125	5.84	465	3.95
76	6.11	151	5.85	532	3.79
78	6.06	173	5.58	591	3.68
83	5.79	191	5.41	648	3.58
87	5.62	204	5.25	697	3.53
94	5.62	221	5.03	750	3.42
100	5.46				


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NO. 74 - 5 - 303
49-54.0 N 143-40.0 W
MO.-6 DAY-23 GMT-22.8

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5-303 DATE 23- 6-74
POSITION 49-54.0N 143-40.0W GMT 22.8
RESULTS OF XBT CAST 42 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	8.30	106	4.79	244	4.89
13	8.24	118	5.12	259	4.89
15	8.19	132	5.71	275	4.88
18	7.98	141	5.77	291	4.61
26	7.92	142	5.88	316	4.55
33	7.39	145	5.88	350	4.44
39	7.34	147	5.82	395	4.32
46	7.23	152	6.20	398	4.21
52	7.02	167	6.09	456	4.10
56	6.53	169	5.87	501	4.04
67	6.21	193	5.82	546	3.92
74	5.67	207	5.71	590	3.81
86	5.17	222	5.54	654	3.69
96	4.90	231	5.43	751	3.51


TEMPERATURE, C
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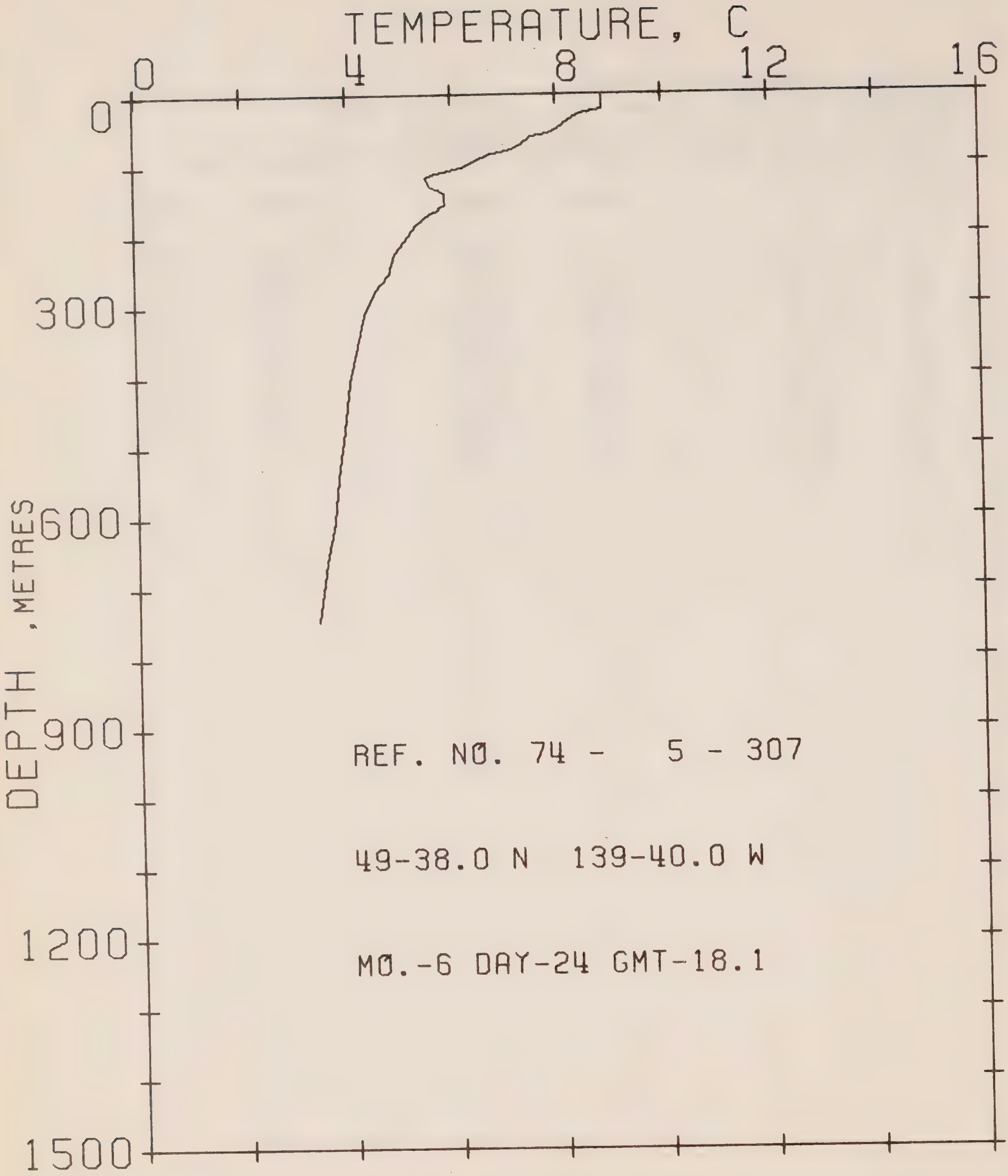
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NO. 74 - 5 - 305
49-45.0 N 141-40.0 W
MO.-6 DAY-24 GMT-12.0

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5-305 DATE 24- 6-74
POSITION 49-45.0N 141-40.0W GMT 12.0
RESULTS OF XBT CAST 29 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
5	8.40	93	5.35	319	4.11
16	8.35	113	4.97	351	4.11
18	8.35	128	5.14	364	4.17
33	8.14	152	5.30	436	4.06
36	7.72	183	5.36	476	3.95
42	7.29	188	5.25	544	3.79
49	7.08	210	5.14	611	3.63
61	6.54	231	4.87	666	3.52
77	6.33	258	4.60	750	3.36
87	5.73	285	4.32		


TEMPERATURE, C
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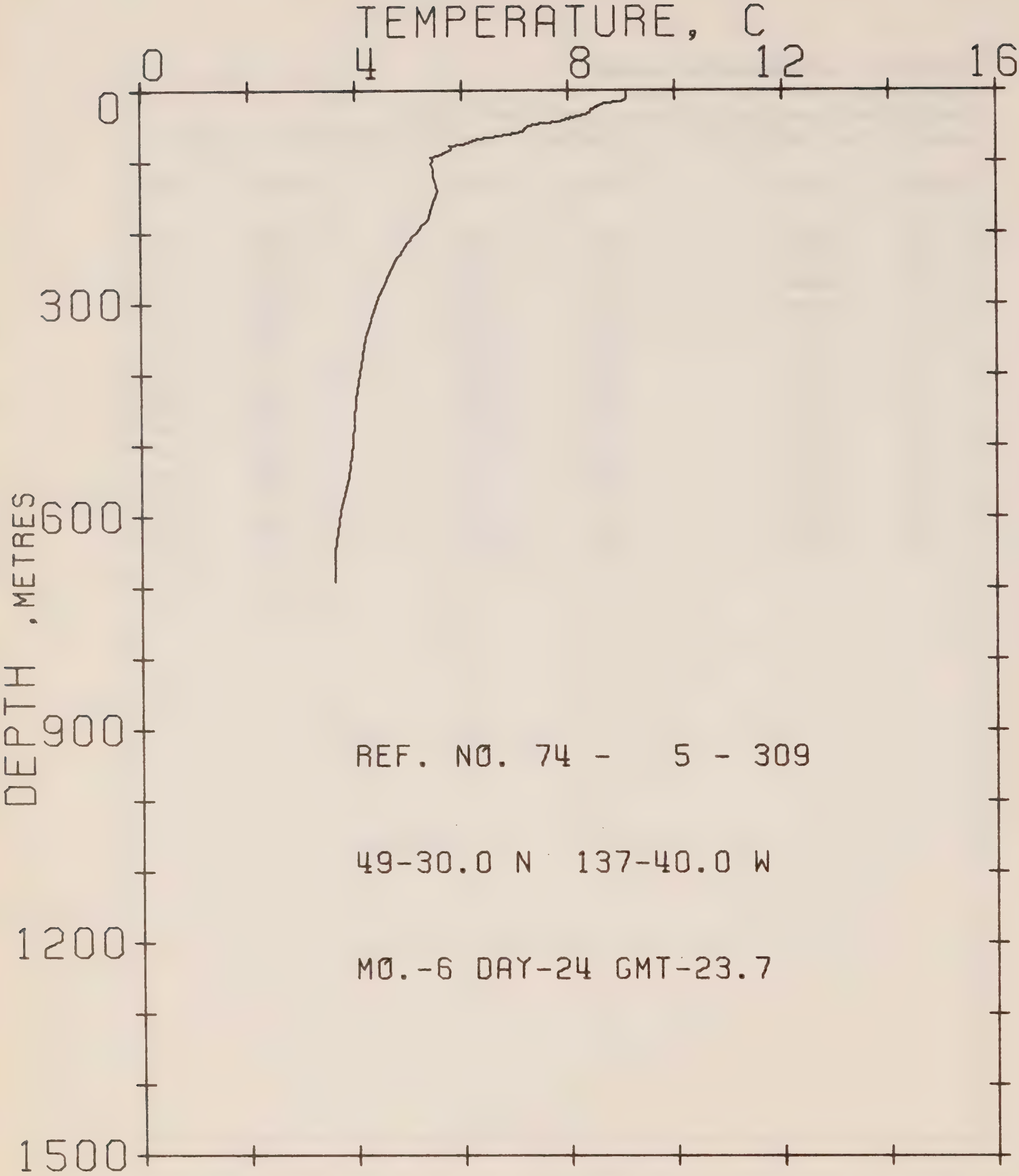
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NØ. 74 - 5 - 307
49-38.0 N 139-40.0 W
MØ.-6 DAY-24 GMT-18.1

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5-307 DATE 24- 6-74
POSITION 49-38.0N 139-40.0W GMT 18.1
RESULTS OF XBT CAST 42 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
2	8.77	105	6.07	168	5.48
22	8.77	110	5.74	185	5.21
26	8.46	114	5.47	200	5.05
31	8.30	119	5.36	225	4.78
42	8.04	125	5.42	254	4.67
48	7.93	132	5.48	279	4.40
57	7.72	135	5.64	312	4.19
61	7.40	137	5.64	357	4.03
71	7.25	140	5.75	408	3.87
79	7.03	146	5.75	476	3.77
83	6.82	153	5.75	545	3.62
85	6.66	157	5.75	607	3.52
95	6.34	160	5.64	664	3.36
99	6.23	164	5.64	749	3.20


TEMPERATURE, C
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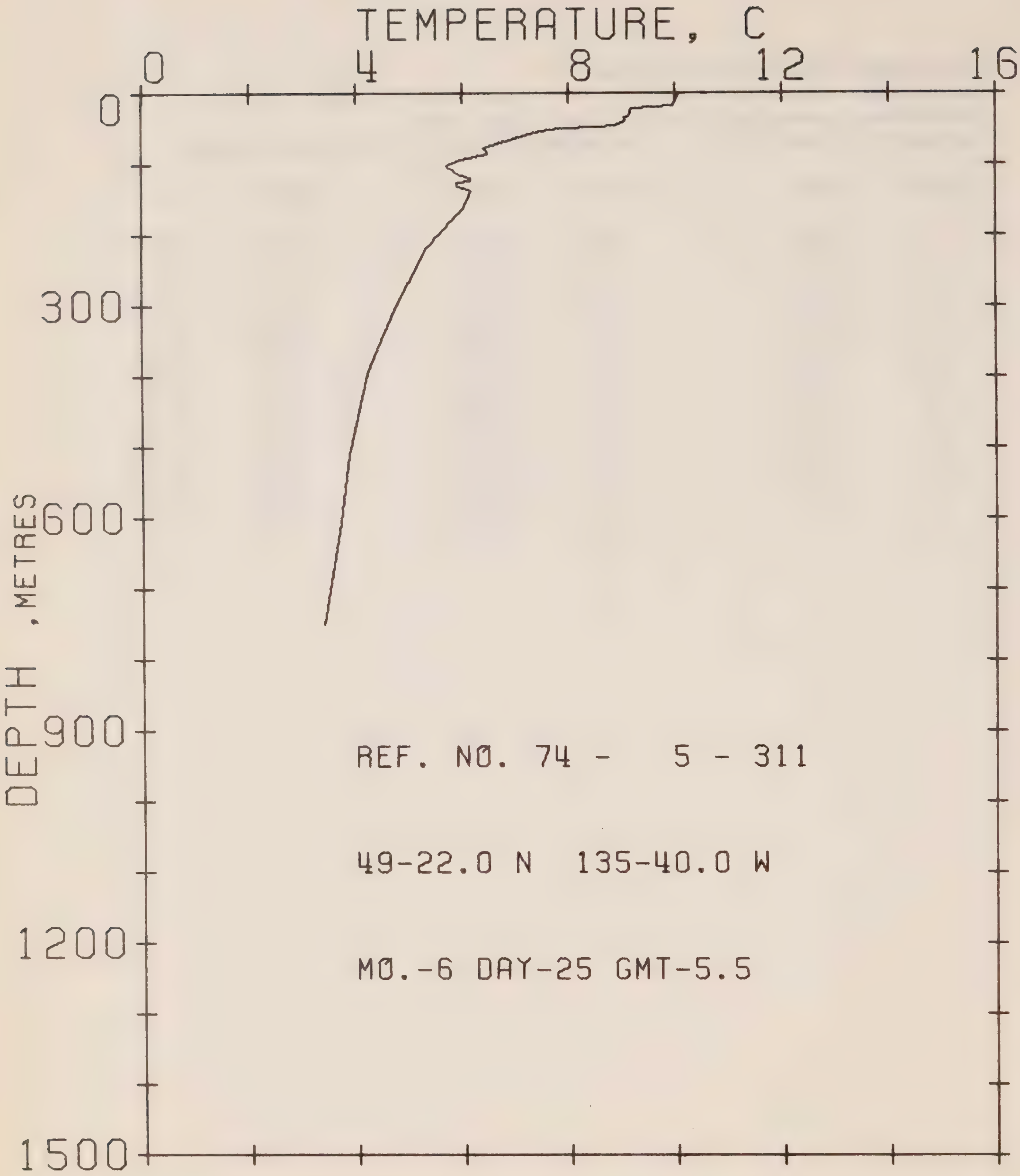
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NO. 74 - 5 - 309
49-30.0 N 137-40.0 W
MO.-6 DAY-24 GMT-23.7

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5-309 DATE 24- 6-74
POSITION 49-30.0N 137-40.0W GMT 23.7
RESULTS OF XBT CAST 39 POINTS TAKEN FROM ANALOG TRACE

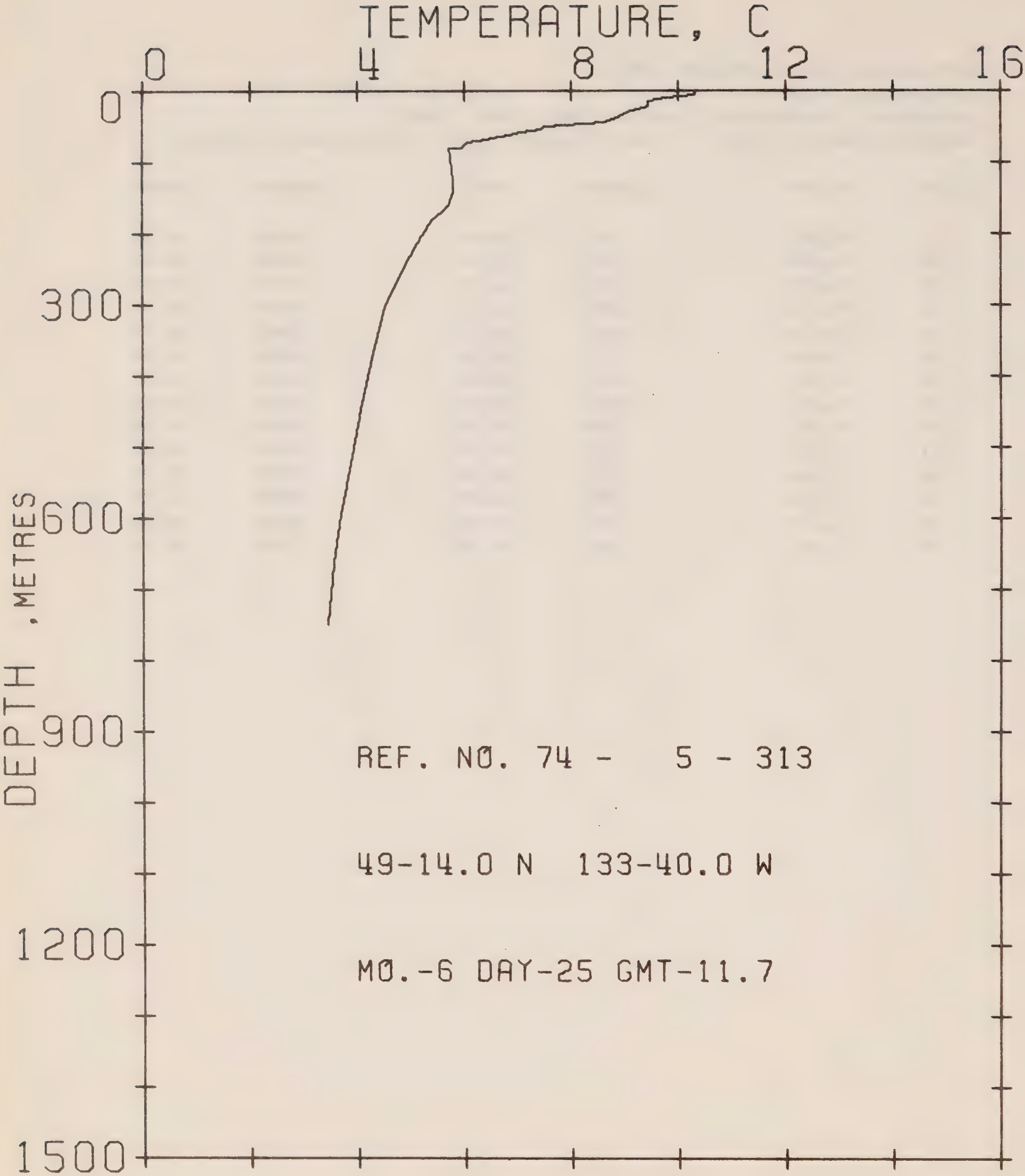
DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
2	9.09	76	6.00	180	5.34
13	9.09	78	5.73	207	5.02
16	8.98	82	5.78	240	4.69
18	8.67	91	5.62	293	4.36
27	8.45	95	5.40	349	4.13
33	8.40	100	5.45	389	4.02
41	7.98	104	5.40	436	3.91
45	7.82	111	5.45	497	3.86
47	7.50	120	5.45	546	3.75
51	7.23	122	5.45	594	3.58
58	7.13	129	5.45	650	3.47
65	6.70	143	5.51	693	3.47
68	6.32	164	5.40	752	3.35



TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NO. 74 - 5 - 311
49-22.0 N 135-40.0 W
MO.-6 DAY-25 GMT-5.5

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5-311 DATE 25- 6-74
POSITION 49-22.0N 135-40.0W GMT 5.5
RESULTS OF XBT CAST 42 POINTS TAKEN FROM ANALOG TRACE

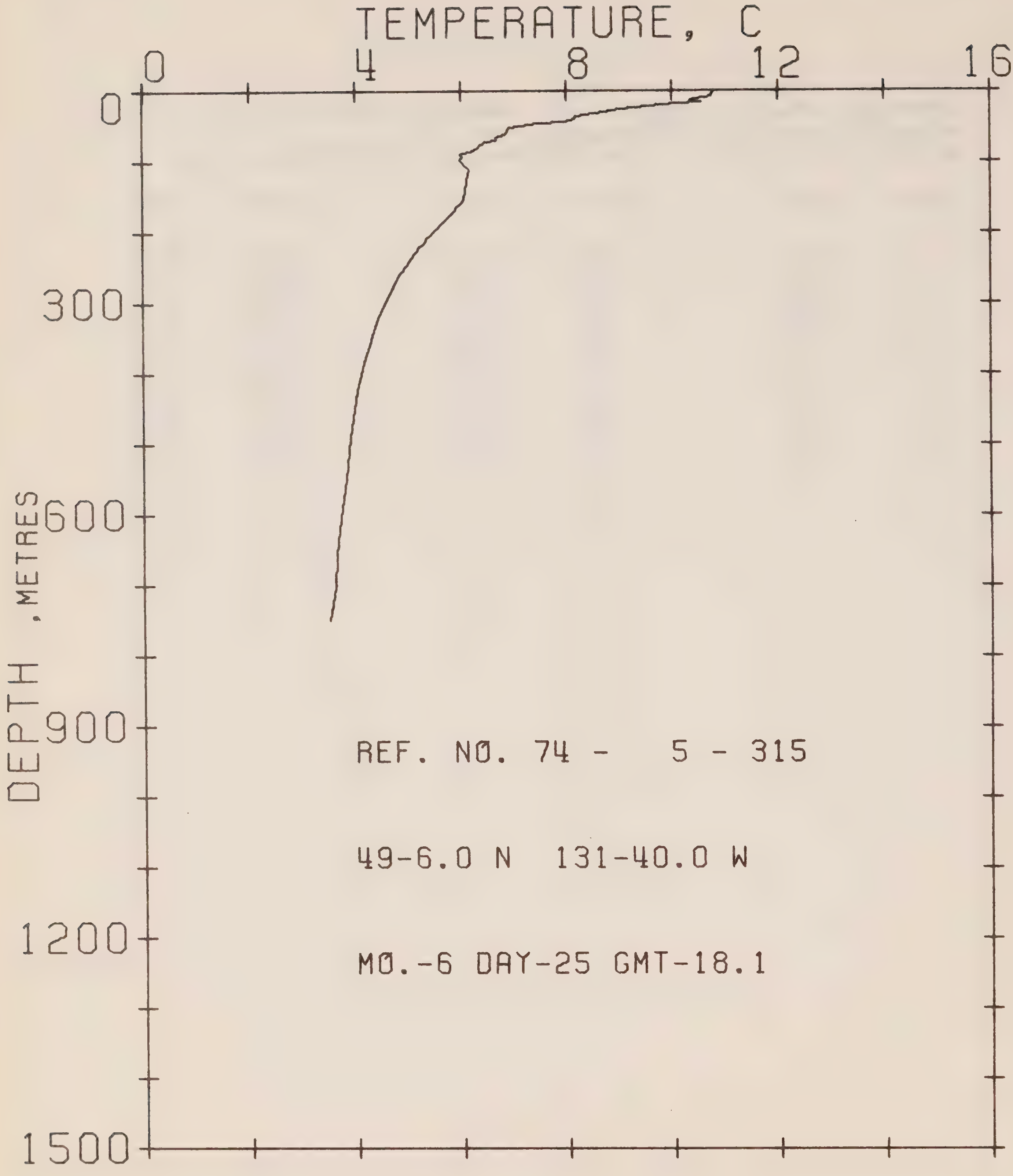
DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
1	10.08	87	6.46	163	6.00
18	9.98	95	5.97	179	5.78
22	9.20	100	5.76	197	5.57
29	9.15	105	5.71	219	5.31
30	9.15	108	5.81	242	5.15
37	9.04	112	5.82	268	4.94
40	9.05	118	6.04	299	4.73
46	8.84	121	6.14	349	4.42
49	8.52	124	6.15	397	4.16
51	7.84	125	5.87	458	3.96
54	7.46	133	5.88	513	3.81
58	7.25	135	6.04	560	3.71
71	6.72	139	6.15	609	3.62
79	6.40	144	6.10	750	3.28



TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NO. 74 - 5 - 313
49-14.0 N 133-40.0 W
MO.-6 DAY-25 GMT-11.7

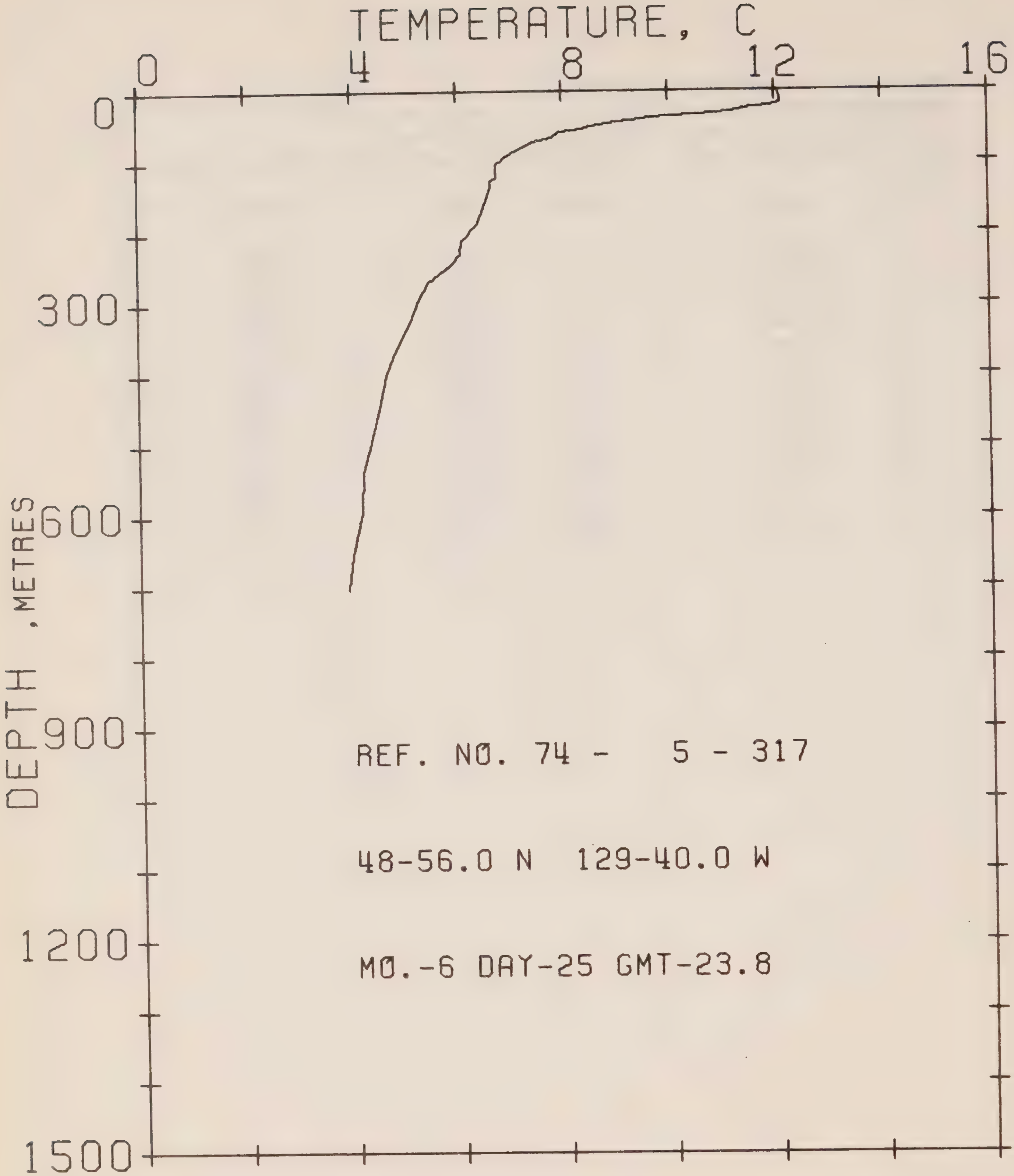
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5-313 DATE 25- 6-74
POSITION 49-14.0N 133-40.0W GMT 11.7
RESULTS OF XBT CAST 30 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
1	10.34	58	7.06	183	5.37
6	10.28	65	6.69	215	5.09
10	9.76	67	6.47	254	4.81
15	9.45	69	6.42	305	4.47
22	9.45	72	6.04	367	4.24
31	9.03	80	5.93	448	4.00
41	8.76	81	5.71	515	3.82
45	8.61	128	5.76	596	3.59
50	7.49	143	5.76	665	3.46
55	7.44	161	5.70	750	3.34


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NØ. 74 - 5 - 315
49-6.0 N 131-40.0 W
MØ.-6 DAY-25 GMT-18.1

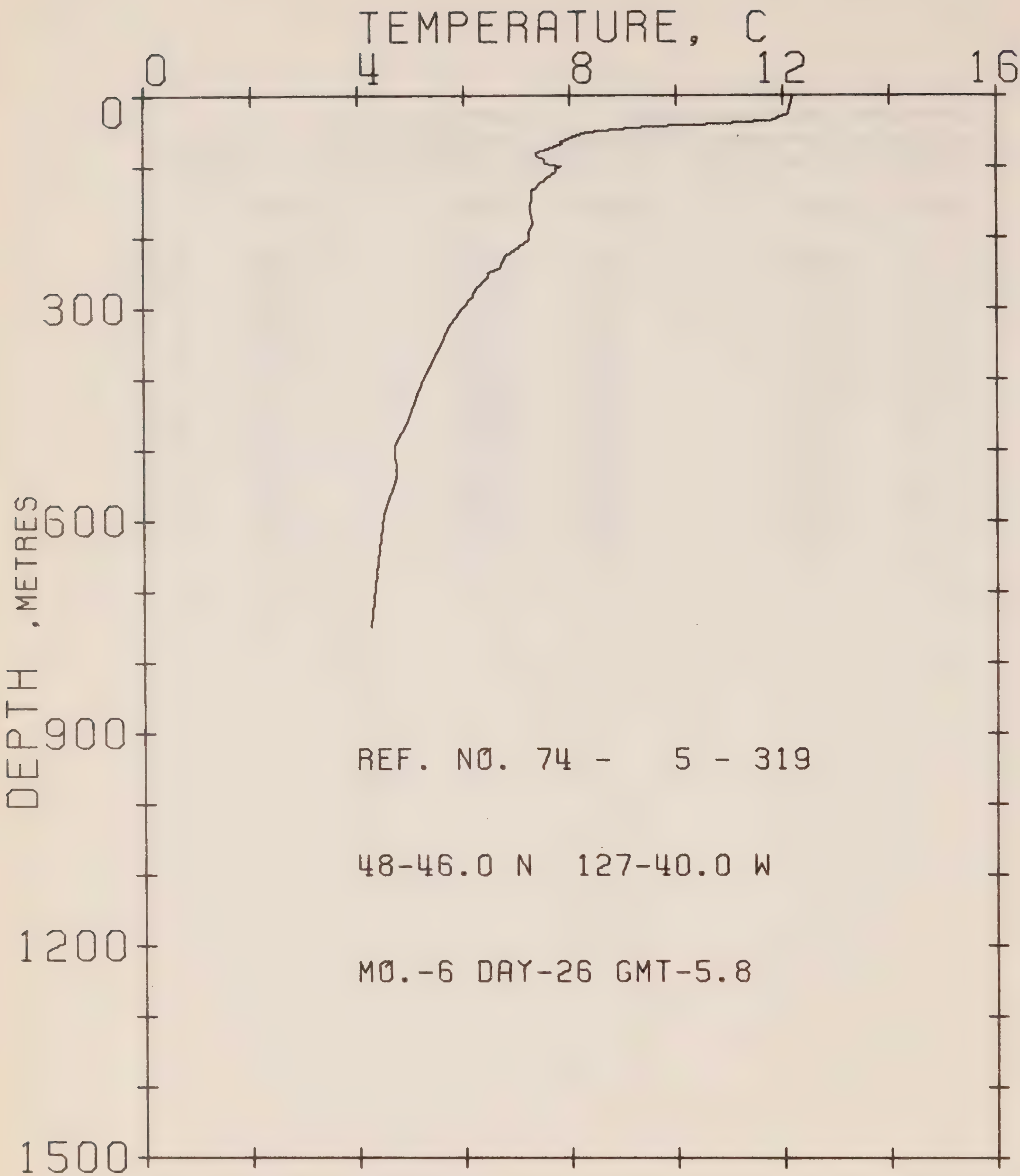
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5-315 DATE 25- 6-74
POSITION 49- 6.0N 131-40.0W GMT 18.1
RESULTS OF XBT CAST 38 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
0	10.80	66	6.65	242	4.93
8	10.75	70	6.65	265	4.71
12	10.44	72	6.43	290	4.55
15	10.34	85	6.22	323	4.33
16	10.55	90	5.95	379	4.06
19	10.08	94	6.00	424	3.89
25	9.04	98	5.95	493	3.73
37	8.19	112	6.11	550	3.63
40	8.14	129	6.06	606	3.52
44	7.93	154	6.01	659	3.41
47	7.45	178	5.69	705	3.36
53	6.92	198	5.42	750	3.25
62	6.81	222	5.14		


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NØ. 74 - 5 - 317
48-56.0 N 129-40.0 W
MØ.-6 DAY-25 GMT-23.8

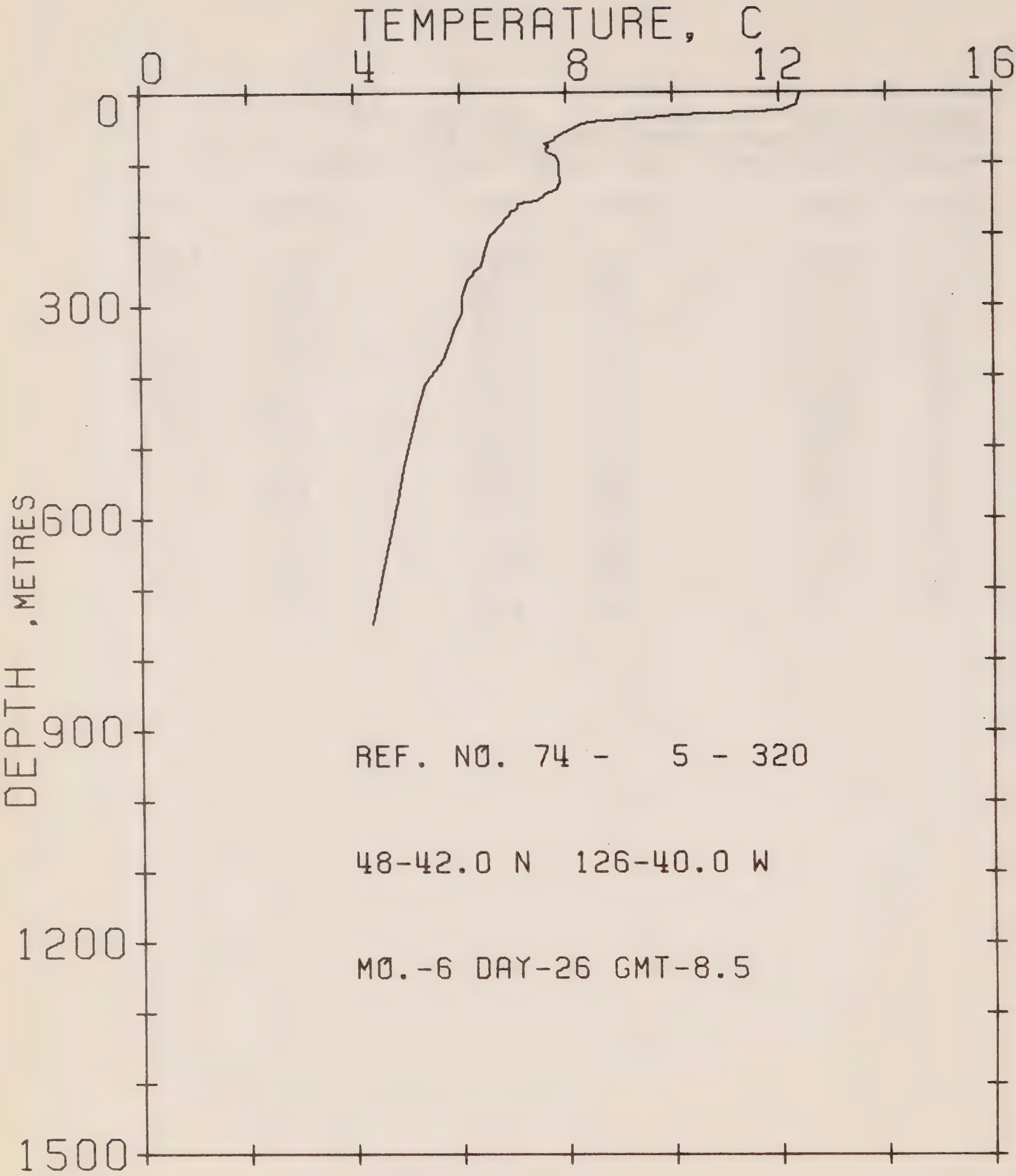
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5-317 DATE 25- 6-74
POSITION 48-56.0N 129-40.0W GMT 23.8
RESULTS OF XBT CAST 39 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	12.09	67	7.78	245	5.82
18	12.10	73	7.41	269	5.39
22	11.89	84	7.09	296	5.17
27	11.38	94	6.87	324	5.02
29	11.33	105	6.71	363	4.75
31	11.12	122	6.72	401	4.53
33	10.91	125	6.61	449	4.38
38	9.61	133	6.61	497	4.22
41	9.51	136	6.61	538	4.06
45	9.04	155	6.51	594	4.01
50	8.52	187	6.35	656	3.80
55	8.36	213	6.03	705	3.70
59	7.93	231	5.98	751	3.60


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NØ. 74 - 5 - 319
48-46.0 N 127-40.0 W
MØ.-6 DAY-26 GMT-5.8

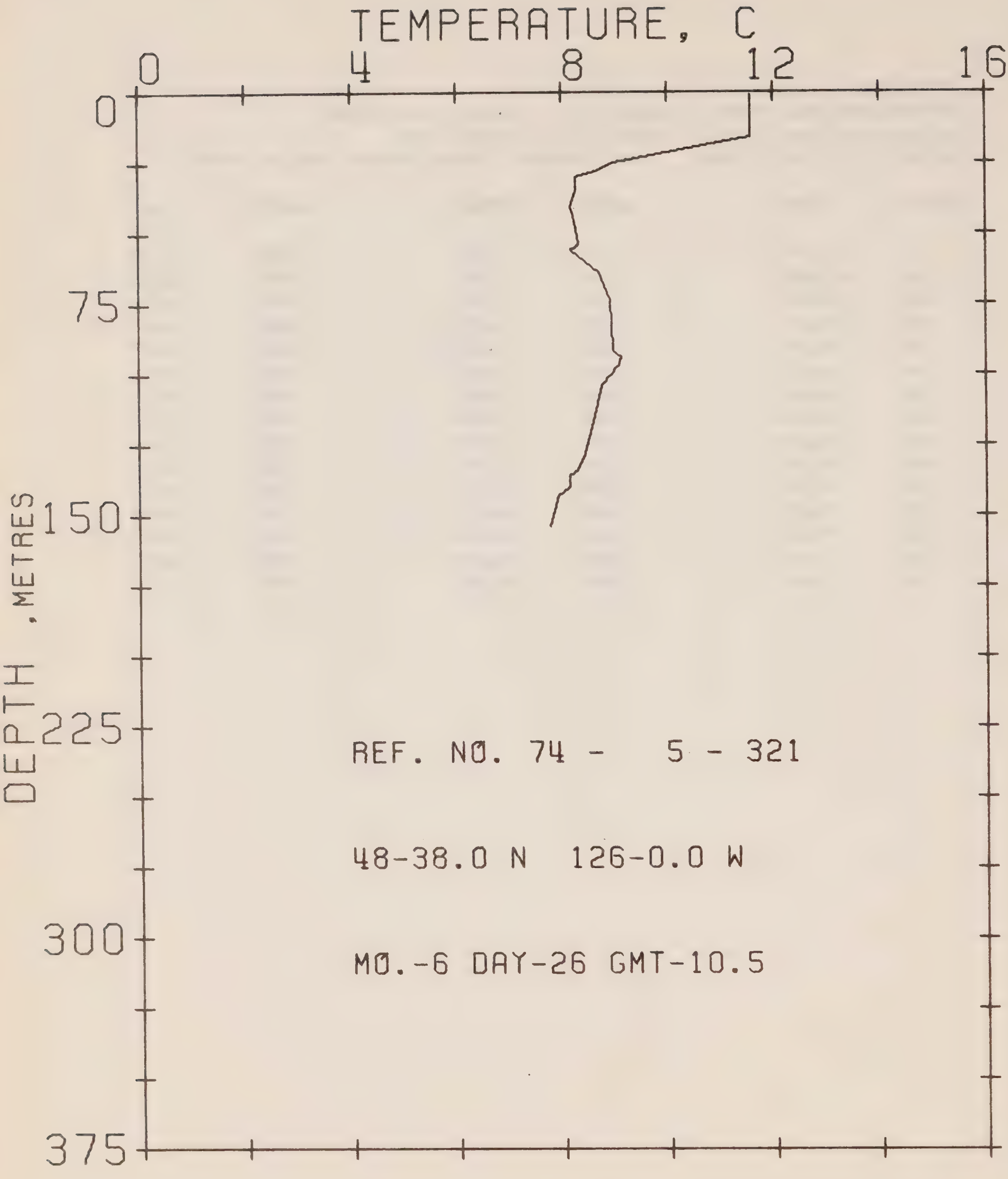
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5-319 DATE 26- 6-74
POSITION 48-46.0N 127-40.0W GMT 5.8
RESULTS OF XBT CAST 48 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
0	12.09	86	7.23	244	6.51
26	12.00	91	7.39	250	6.30
29	11.95	96	7.39	256	6.30
30	11.80	101	7.72	272	6.10
33	11.80	103	7.61	285	6.00
36	11.65	109	7.61	302	5.79
38	11.03	117	7.46	328	5.53
40	10.83	129	7.25	353	5.39
45	9.37	134	7.15	391	5.13
48	8.74	149	7.16	423	4.93
52	8.22	154	7.11	463	4.74
58	7.96	167	7.11	494	4.48
67	7.70	180	7.17	541	4.51
68	7.75	195	7.08	593	4.27
76	7.44	204	7.08	659	4.14
81	7.23	225	6.66	750	3.98


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NØ. 74 - 5 - 320
48-42.0 N 126-40.0 W
MØ.-6 DAY-26 GMT-8.5

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5-320 DATE 26- 6-74
POSITION 48-42.0N 126-40.0W GMT 8.5
RESULTS OF XBT CAST 45 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
1	12.40	85	7.60	245	6.35
18	12.35	89	7.76	246	6.30
25	12.04	98	7.86	265	6.08
29	11.47	107	7.86	289	5.97
32	10.02	113	7.86	311	5.97
34	9.87	126	7.86	336	5.81
38	9.13	137	7.81	375	5.59
40	8.66	142	7.60	410	5.26
45	8.29	152	7.43	450	5.09
54	8.03	157	7.06	485	4.98
62	7.81	163	7.06	532	4.81
69	7.76	166	6.95	576	4.69
73	7.60	187	6.74	633	4.52
75	7.65	203	6.52	688	4.35
78	7.60	226	6.41	750	4.18


TEMPERATURE, C
0
4
8
12
16
0
75
150
225
300
375
DEPTH ,METRES
REF. NØ. 74 - 5 - 321
48-38.0 N 126-0.0 W
MØ.-6 DAY-26 GMT-10.5

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 5-321 DATE 26- 6-74
POSITION 48-38.0N 126- 0.0W GMT 10.5
RESULTS OF XBT CAST 24 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
1	11.58	44	8.20	104	8.73
16	11.58	54	8.30	115	8.58
19	10.70	56	8.15	130	8.37
25	8.98	64	8.68	134	8.26
28	8.62	74	8.89	136	8.11
30	8.25	92	8.94	140	8.11
35	8.25	94	9.10	143	7.90
41	8.14	97	9.05	154	7.74

SURFACE TEMPERATURE AND SALINITY OBSERVATIONS

(P-74-5)

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
CRUISE REFERENCE NUMBER 74- 5

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
74	5	10	2325	30.741	10.0	125-33
74	5	11	115	30.385	10.6	126- 0
74	5	0	330	30.651	10.2	126-40
74	5	0	720	31.529	10.5	127-40
74	5	0	1140	32.271	9.3	128-40
74	5	11	1900	32.551	8.3	130-40
74	5	12	200	32.499	7.9	132-40
74	5	12	900	32.516	7.3	134-40
74	5	12	1445	32.570	7.3	136-40
74	5	13	0		7.1	139-26
74	5	14	0	32.673	6.1	ON STATION
74	5	15	0	32.671	6.1	ON STATION
74	5	16	0	32.674	6.1	ON STATION
74	5	17	0	32.663	6.0	ON STATION
74	5	18	0	32.681	6.1	ON STATION
74	5	19	0	32.680	6.1	ON STATION
74	5	20	0	32.675	6.0	ON STATION
74	5	21	0	32.662	6.5	ON STATION
74	5	22	0	32.654	6.9	ON STATION
74	5	23	0	32.660	6.8	ON STATION
74	5	24	0	32.638	7.1	ON STATION
74	5	25	0	32.591	7.0	ON STATION
74	5	26	0	32.628	7.2	ON STATION
74	5	27	0	32.654	6.9	ON STATION
74	5	28	0	32.647	7.1	ON STATION
74	5	29	0	32.648	7.2	ON STATION
74	5	30	0	32.660	7.1	ON STATION
74	5	31	0	32.637	7.4	ON STATION
74	6	1	0	32.611	7.2	ON STATION
74	6	2	0	32.625	7.2	ON STATION
74	6	3	0	32.619	7.2	ON STATION
74	6	4	0	32.620	7.6	ON STATION
74	6	5	0	32.618	7.4	ON STATION
74	6	6	0		6.8	ON STATION
74	6	7	0	32.590	7.3	ON STATION
74	6	8	0		6.8	ON STATION
74	6	9	0	32.591	7.3	ON STATION
74	6	10	0	32.679	6.9	ON STATION
74	6	11	0	32.630	7.0	ON STATION
74	6	12	0	32.616	7.3	ON STATION
74	6	13	0	32.628	7.5	ON STATION
74	6	14	0		7.5	ON STATION
74	6	15	0	32.616	7.5	ON STATION
74	6	16	0	32.623	7.4	ON STATION
74	6	17	0	32.626	7.5	ON STATION

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
CRUISE REFERENCE NUMBER 74- 5

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
74	6	17	0	32.626	7.5	ON STATION
74	6	18	0	32.632	7.9	ON STATION
74	6	19	0	32.617	7.8	ON STATION
74	6	20	0	32.626	7.9	ON STATION
74	6	21	0	32.636	7.8	ON STATION
74	6	22	0	32.644	7.9	ON STATION
74	6	23	0	32.646	8.2	ON STATION
74	6	24	0		8.4	ON STATION
74	6	24	315	32.584	8.3	142-40
74	6	24	1430	32.568	8.4	140-40
74	6	24	2100	32.588	8.8	138-40
74	6	25	230	32.560	9.7	136-40
74	6	25	830	32.495	10.2	134-40
74	6	25	1430	32.473	10.4	132-40
74	6	25	2030	32.546	11.3	130-40
74	6	26	230	32.056	12.3	128-40

OCEANOGRAPHIC DATA OBTAINED ON CRUISE P-74-6

(CODC REFERENCE NO. 15-74-006)

RESULTS OF HYDROGRAPHIC OBSERVATIONS

(P-74-6)

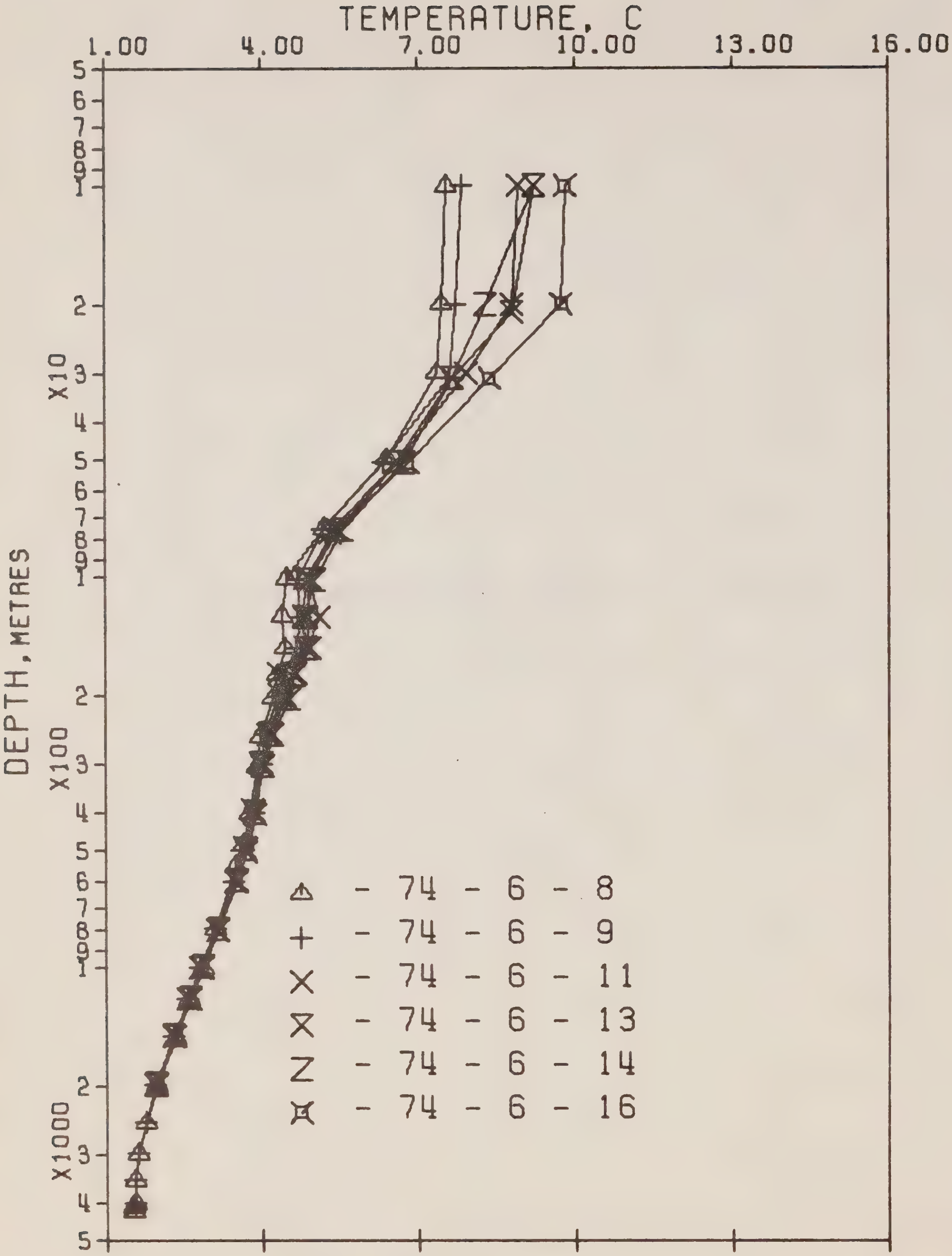


Figure 7 Composite plot of temperature vs $\log_{10}$ depth. P-74-6

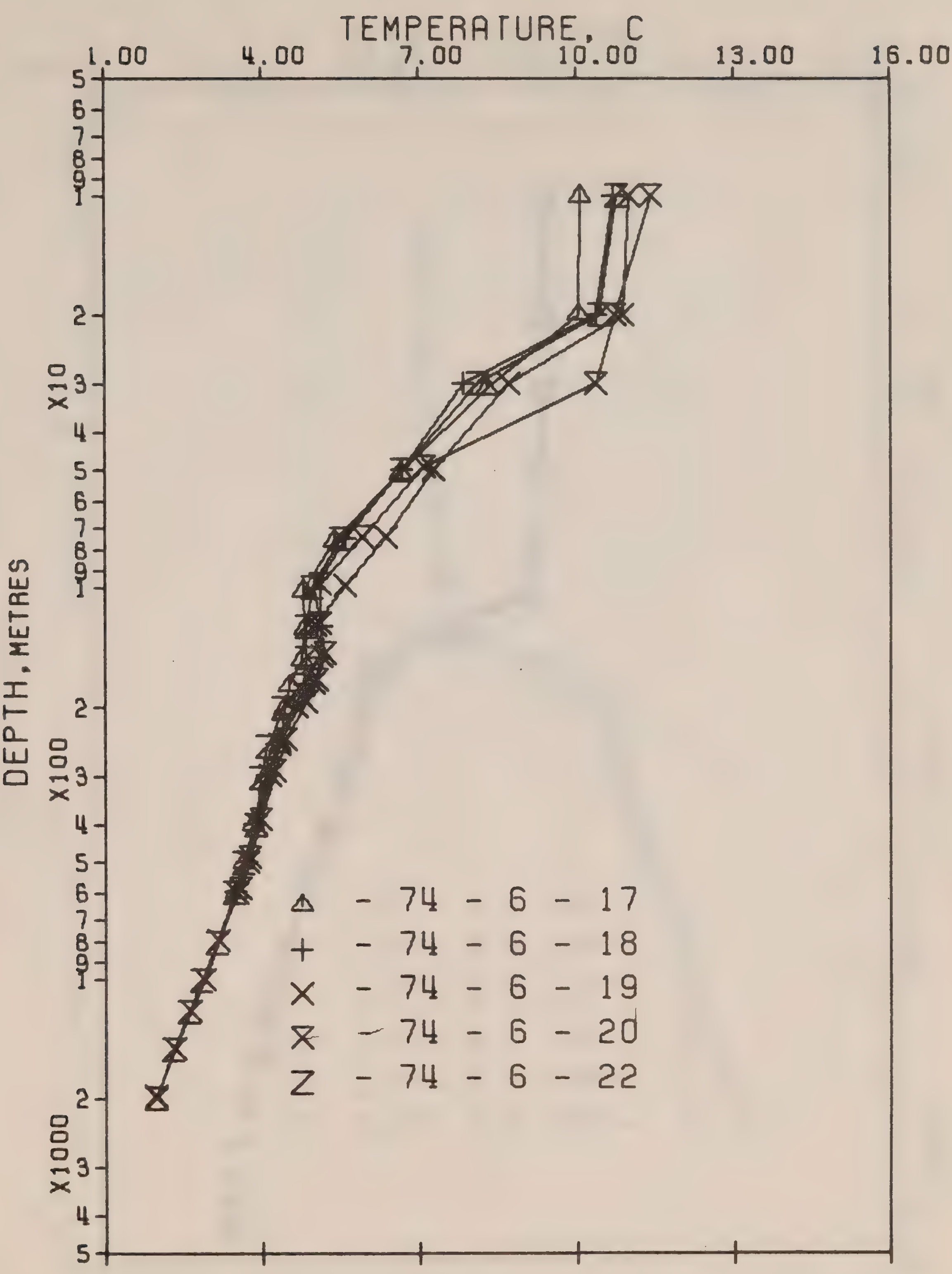


Figure 8 Composite plot of temperature vs $\log_{10}$ depth. P-74-6

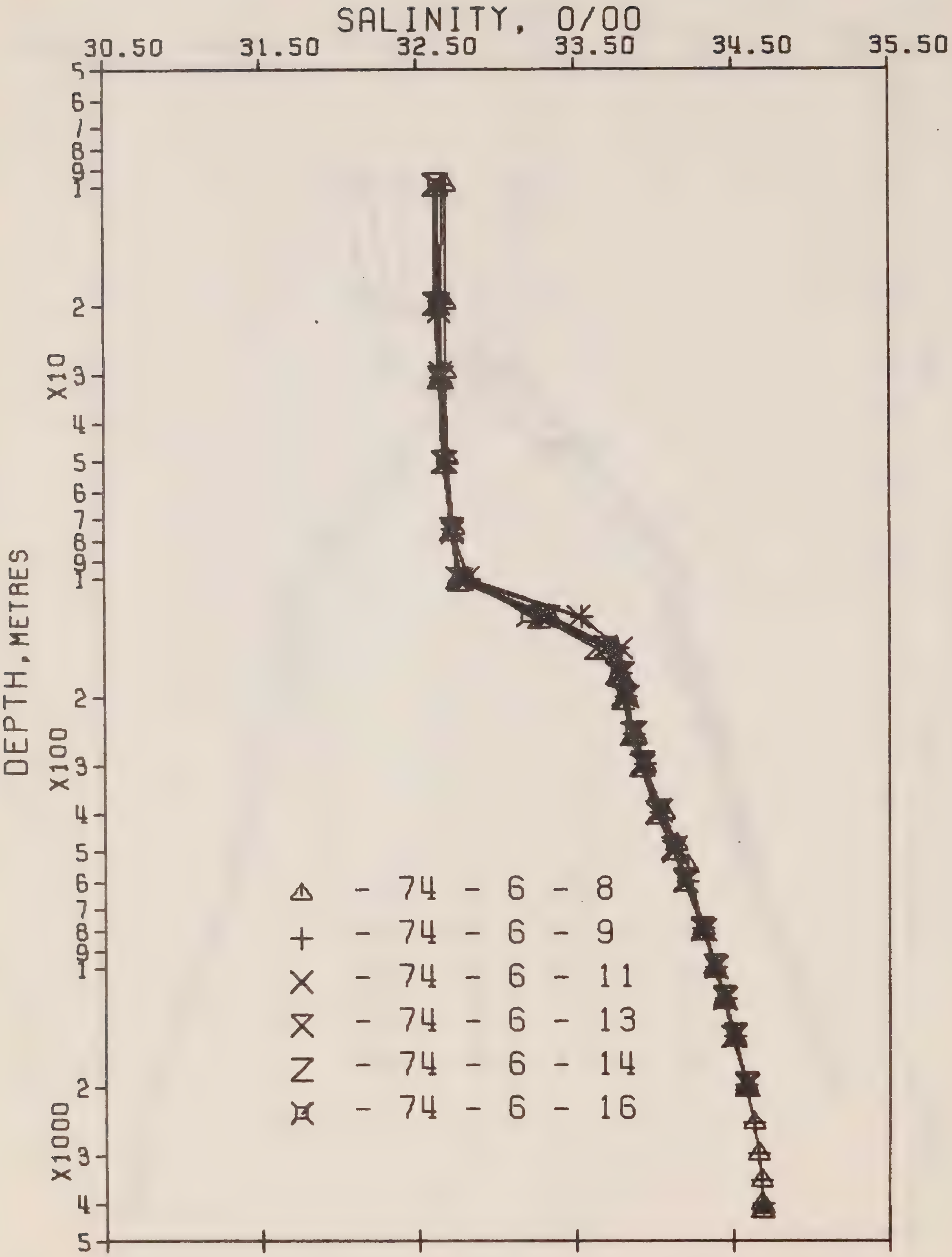


Figure 9 Composite plot of salinity vs $\log_{10}$ depth. P-74-6

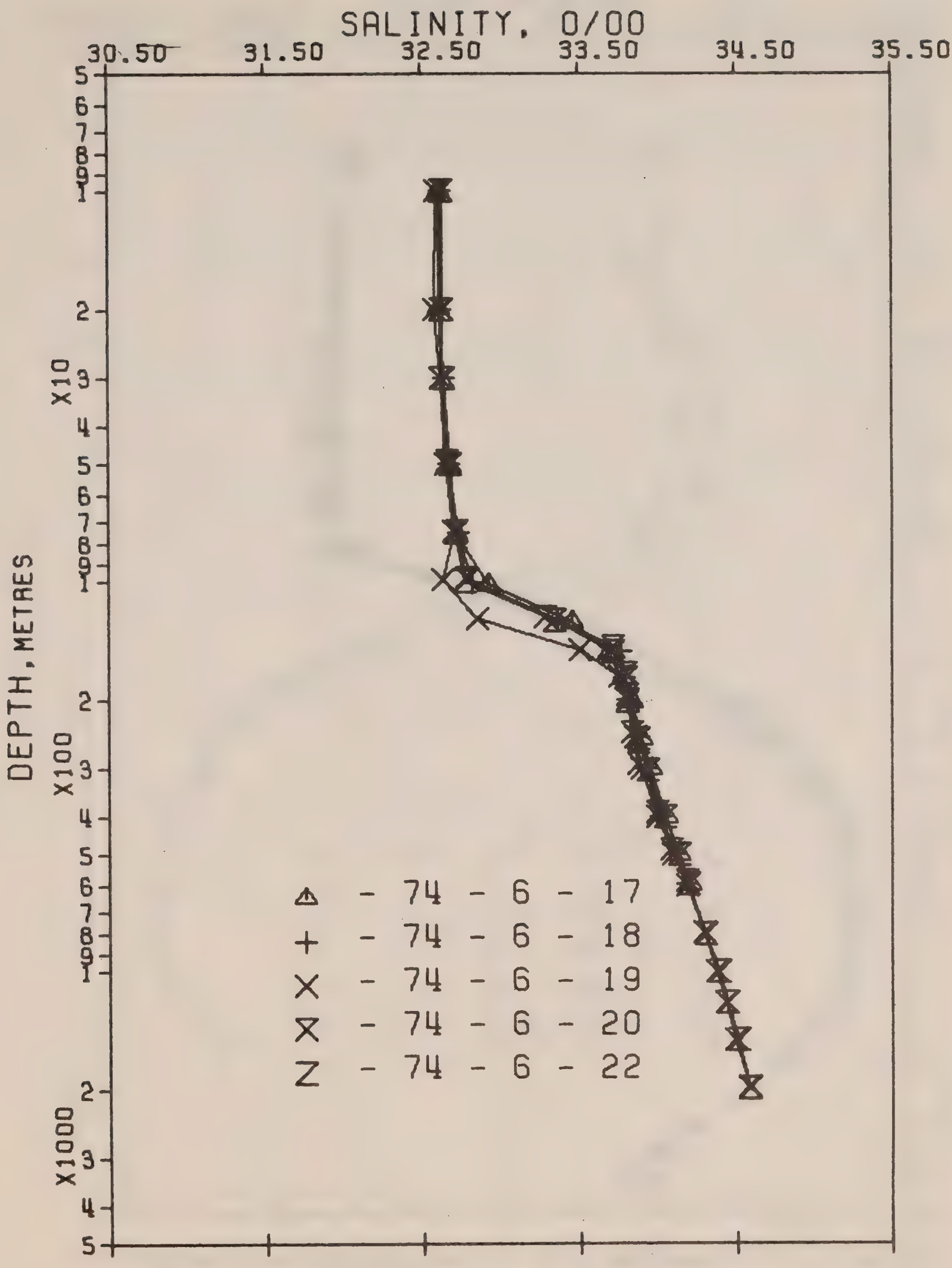


Figure 10 Composite plot of salinity vs $\log_{10}$ depth. P-74-6

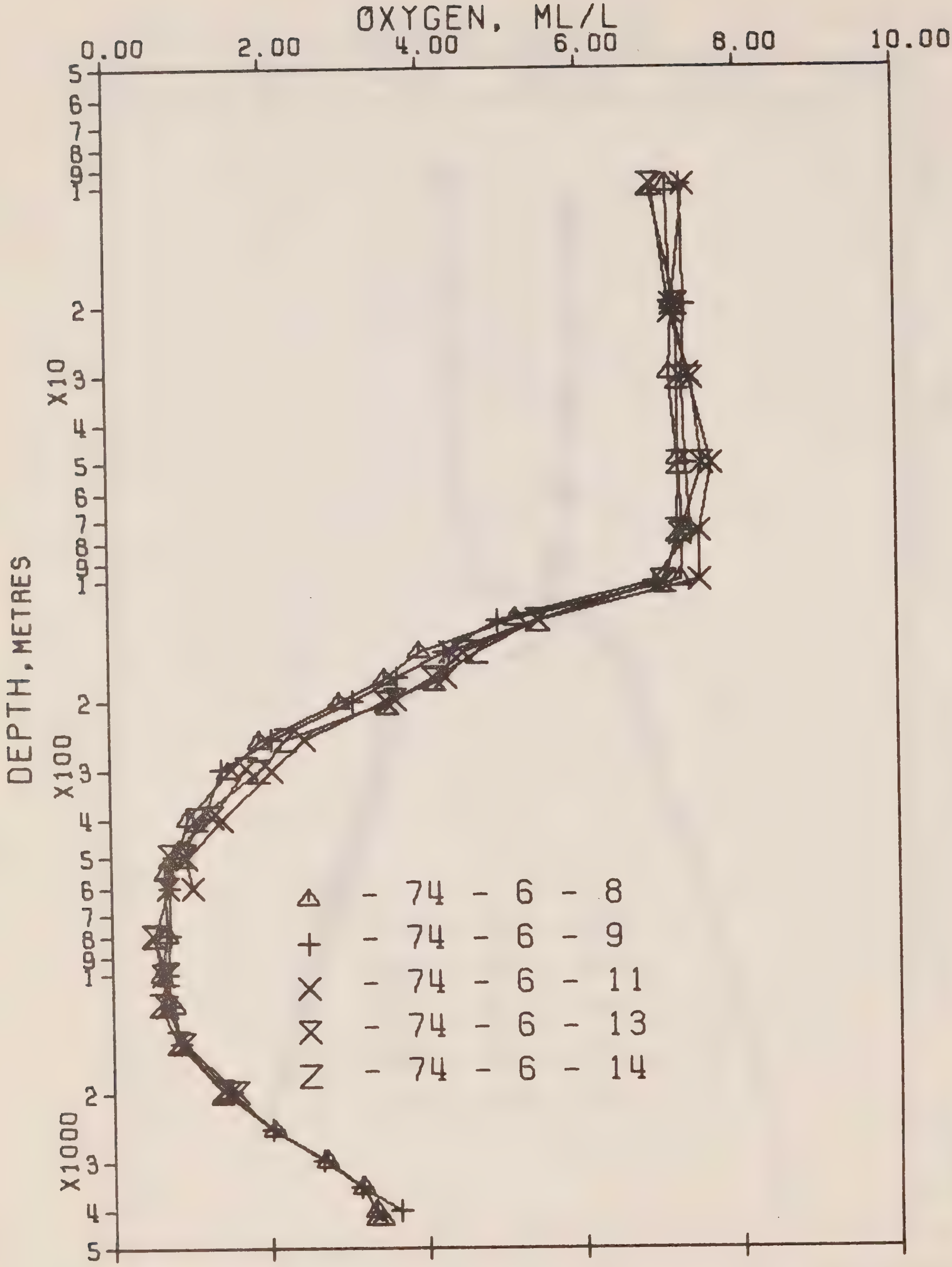


Figure 11 Composite plot of oxygen vs $\log_{10}$ depth. P-74-6

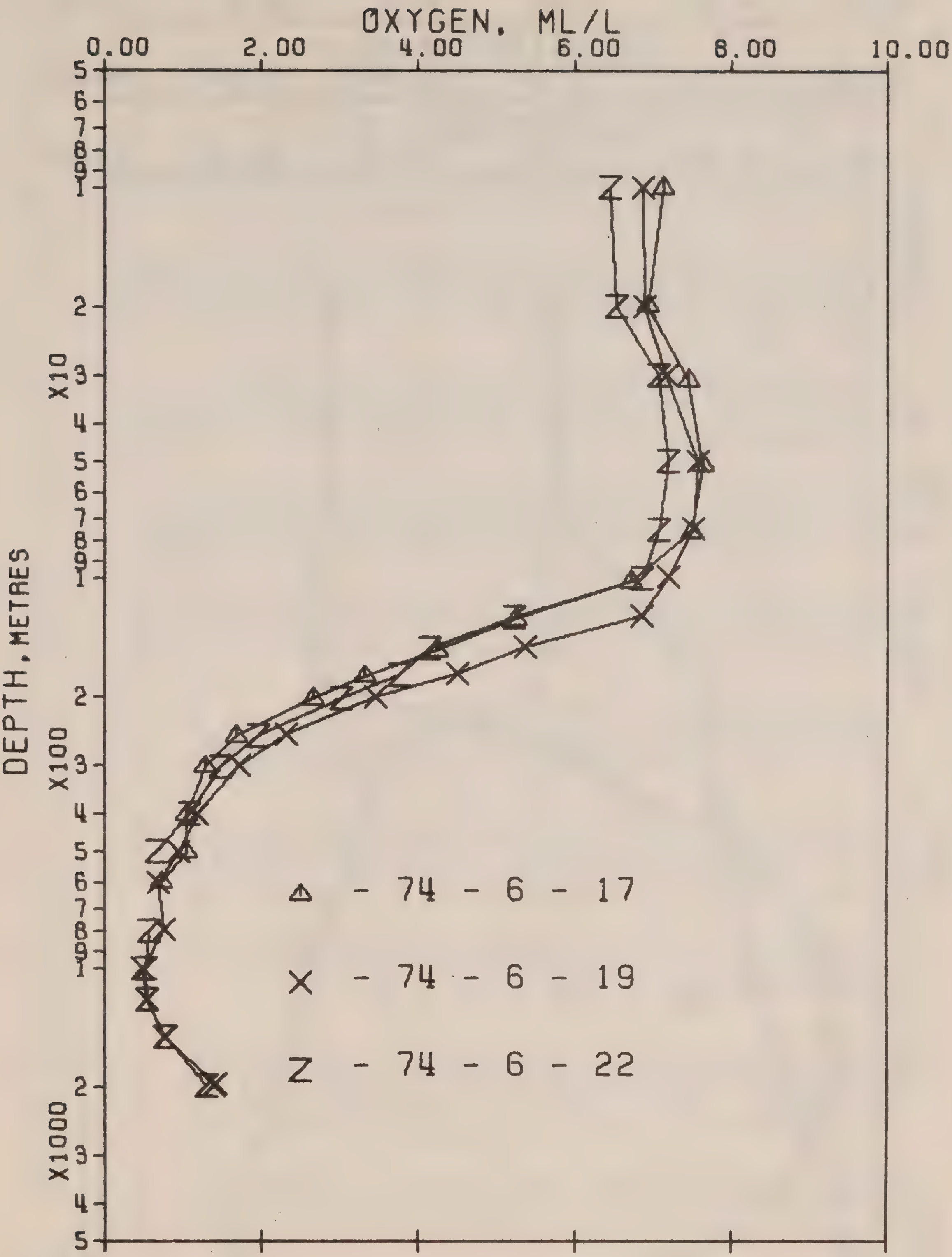
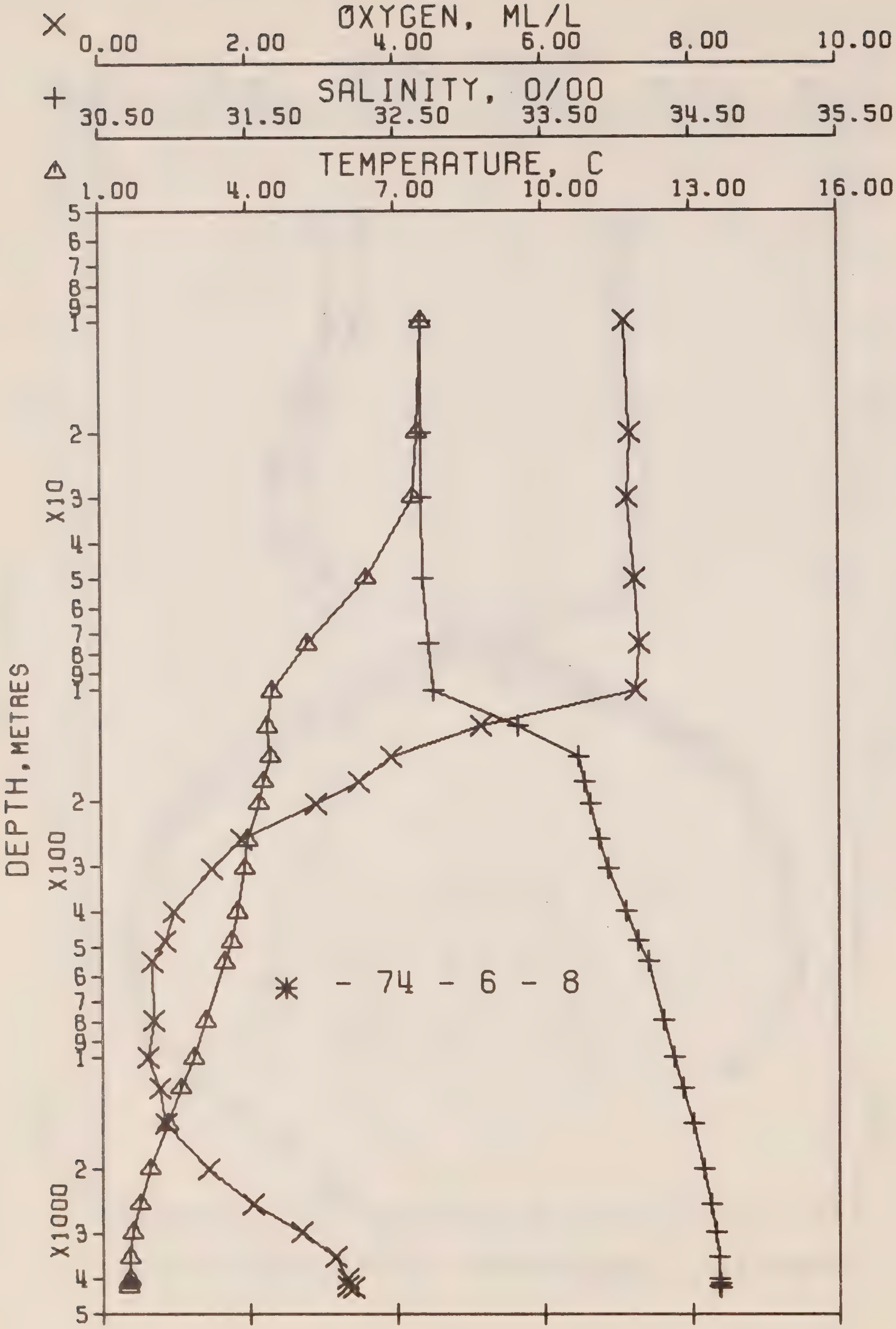
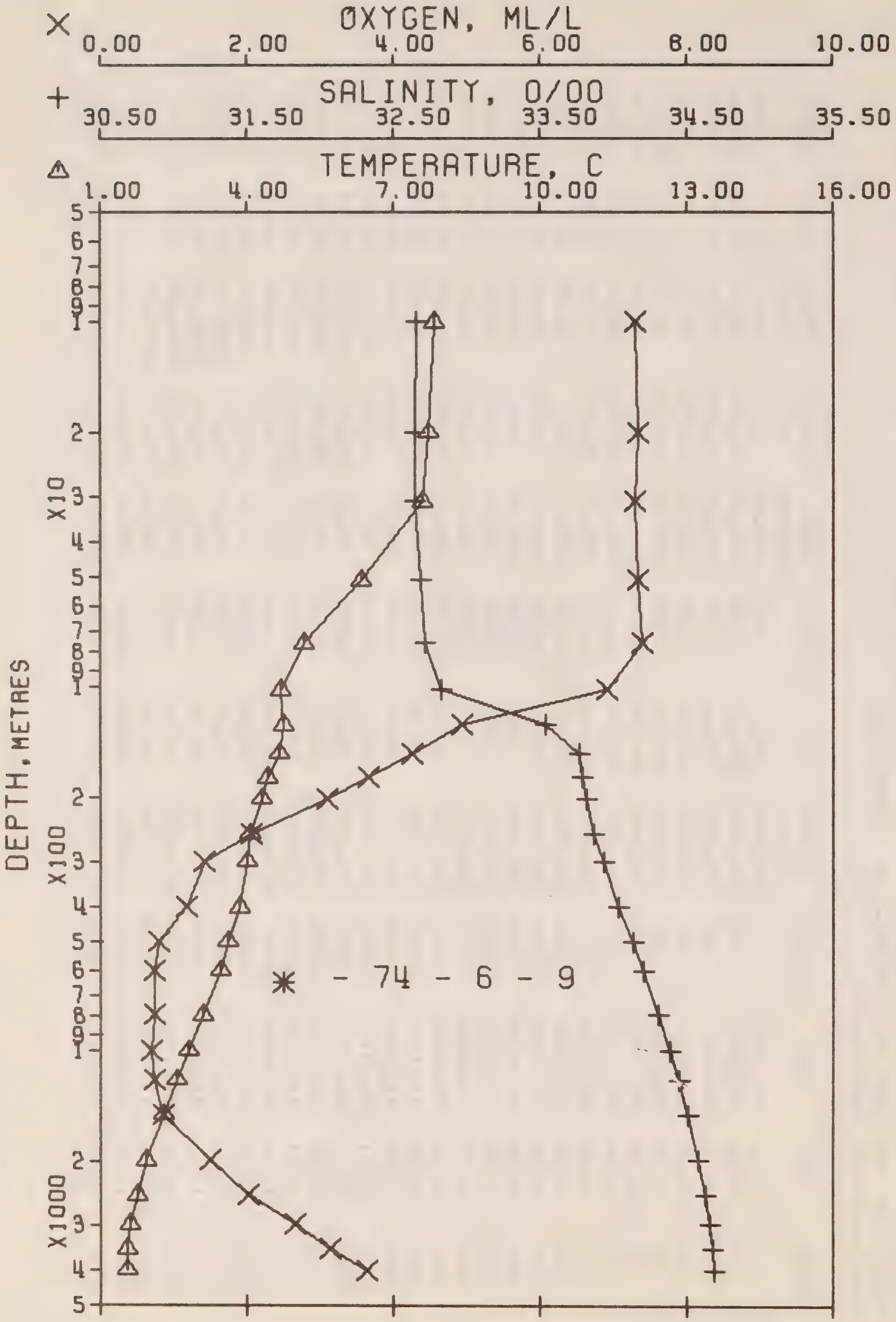


Figure 12 Composite plot of oxygen vs $\log_{10}$ depth. P-74-6


OXYGEN, ML/L
0.00
2.00
4.00
6.00
8.00
10.00
SALINITY, 0/00
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
✳ - 74 - 6 - 8

OFFSHORE OCEANOGRAPHY GROUP   REFERENCE NO. 74- 6- 8   DATE 27/ 6/74
POSITION 50- 9.5 N, 146-47.0 W   GMT 18.0
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	7.57	32.680	0	25.540	245.6	7.57	245.4	0.0	0.0	7.17	1478.
10	7.54	32.681	10	25.545	245.3	7.54	244.9	0.25	0.01	7.12	1478.
20	7.46	32.680	20	25.555	244.4	7.46	243.9	0.49	0.05	7.19	1478.
30	7.35	32.677	30	25.568	243.4	7.35	242.6	0.74	0.11	7.14	1478.
50	6.39	32.692	50	25.707	230.3	6.39	229.4	1.22	0.31	7.24	1474.
75	5.21	32.730	75	25.879	214.0	5.20	213.0	1.78	0.67	7.30	1470.
102	4.48	32.765	101	25.987	203.9	4.47	202.8	2.33	1.17	7.26	1468.
127	4.40	33.329	126	26.442	161.0	4.39	159.6	2.79	1.70	5.15	1468.
153	4.44	33.738	152	26.762	130.9	4.43	129.2	3.17	2.24	3.93	1470.
179	4.31	33.785	178	26.813	126.3	4.30	124.3	3.50	2.80	3.51	1469.
205	4.20	33.818	204	26.851	122.9	4.19	120.7	3.82	3.44	2.92	1469.
258	3.98	33.878	256	26.921	116.6	3.96	114.0	4.45	4.92	1.90	1469.
308	3.91	33.944	306	26.981	111.3	3.89	108.3	5.03	6.58	1.50	1470.
404	3.75	34.059	401	27.088	101.8	3.72	98.1	6.05	10.29	0.98	1471.
488	3.64	34.145	484	27.167	94.9	3.61	90.5	6.87	14.03	0.87	1472.
555	3.48	34.208	550	27.233	89.0	3.44	84.3	7.48	17.28	0.67	1473.
801	3.11	34.310	794	27.349	79.3	3.06	73.1	9.52	31.45	0.69	1475.
1011	2.85	34.379	1001	27.428	72.6	2.78	65.6	11.11	46.13	0.63	1478.
1219	2.60	34.443	1206	27.501	66.4	2.52	58.6	12.55	62.50	0.78	1480.
1527	2.31	34.510	1510	27.579	59.7	2.21	51.1	14.49	89.58	0.85	1484.
2032	1.95	34.585	2007	27.668	52.2	1.81	42.4	17.29	140.43	1.45	1491.
2534	1.75	34.635	2500	27.723	47.9	1.57	37.0	19.79	198.53	2.05	1499.
3039	1.59	34.657	2995	27.753	45.7	1.36	33.9	22.14	265.41	2.70	1507.
3553	1.53	34.678	3497	27.774	44.8	1.25	31.6	24.46	343.10	3.15	1515.
4083	1.53	34.683	4014	27.778	45.8	1.20	30.8	26.86	436.66	3.32	1524.
4192	1.52	34.686	4120	27.781	45.8	1.17	30.4	27.36	457.67		1526.
4239	1.52	34.683	4215	27.779	46.2	1.16	30.6	27.81	477.28	3.32	1528.
4301	1.52	34.691	4226	27.785	45.7	1.16	29.9	27.86	479.55	3.39	1528.


OXYGEN, ML/L
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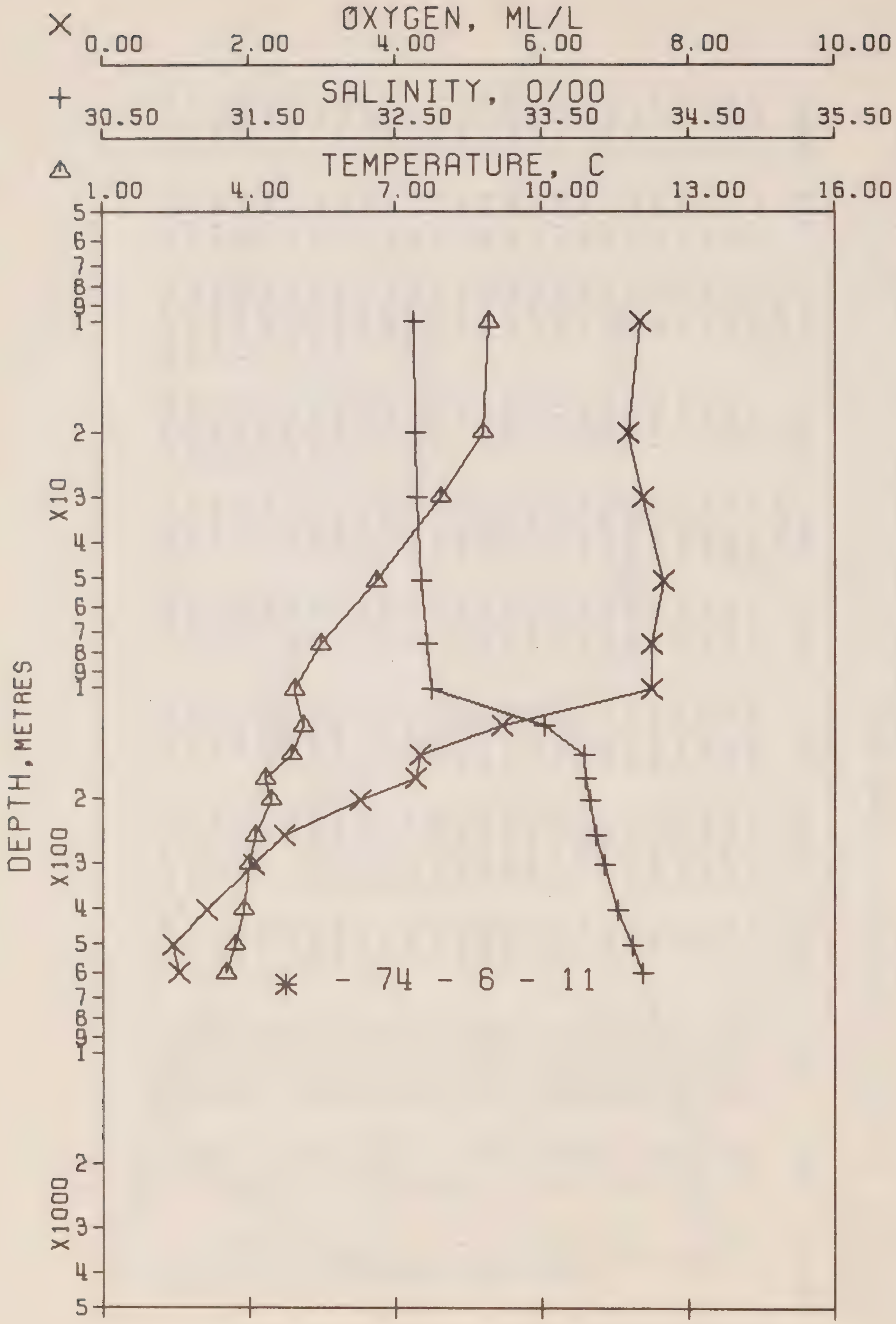
SALINITY, O/OO
30.50 31.50 32.50 33.50 34.50 35.50
TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
* - 74 - 6 - 9

OFFSHORE OCEANOGRAPHY GROUP REFERENCE NO. 74- 6- 9 DATE 1/ 7/74
POSITION 50-21.5 N, 145-27.0 W GMT 22.1
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	8.04	32.650	0	25.449	254.2	8.04	254.0	0.0	0.0	7.25	1480.
10	7.84	32.656	10	25.482	251.2	7.84	250.8	0.25	0.01	7.30	1479.
20	7.73	32.654	20	25.497	249.9	7.73	249.4	0.51	0.05	7.34	1479.
31	7.61	32.654	31	25.514	248.6	7.61	247.8	0.78	0.12	7.30	1479.
51	6.33	32.686	51	25.710	230.0	6.33	229.1	1.27	0.33	7.34	1474.
76	5.17	32.723	76	25.878	214.1	5.16	213.1	1.82	0.69	7.39	1470.
103	4.69	32.832	102	26.017	201.0	4.68	199.9	2.37	1.19	6.93	1469.
128	4.75	33.538	127	26.570	149.0	4.74	147.4	2.81	1.71	4.93	1470.
153	4.66	33.766	152	26.760	131.1	4.65	129.3	3.16	2.20	4.26	1470.
178	4.43	33.793	177	26.807	126.9	4.42	124.9	3.48	2.75	3.65	1470.
203	4.31	33.816	202	26.838	124.2	4.30	121.9	3.80	3.37	3.09	1470.
254	4.05	33.872	252	26.909	117.7	4.03	115.1	4.41	4.79	2.06	1470.
303	4.00	33.944	301	26.972	112.2	3.98	109.2	4.98	6.40	1.41	1470.
404	3.84	34.037	401	27.062	104.4	3.81	100.6	6.07	10.34	1.17	1471.
504	3.62	34.143	500	27.168	95.0	3.58	90.5	7.06	14.94	0.79	1472.
606	3.47	34.212	601	27.237	89.0	3.43	83.9	8.00	20.24	0.74	1473.
803	3.11	34.310	796	27.349	79.3	3.06	73.1	9.65	32.12	0.74	1475.
1006	2.79	34.394	996	27.445	70.9	2.72	64.0	11.17	46.08	0.70	1477.
1207	2.56	34.453	1195	27.512	65.1	2.48	57.6	12.53	61.49	0.75	1480.
1512	2.28	34.514	1495	27.585	59.0	2.18	50.5	14.41	87.55	0.86	1484.
2019	1.94	34.585	1994	27.669	52.0	1.80	42.4	17.21	137.80	1.50	1491.
2526	1.75	34.631	2492	27.720	48.1	1.57	37.2	19.73	196.29	2.02	1499.
3036	1.60	34.658	2992	27.753	45.8	1.37	33.9	22.11	263.90	2.66	1507.
3548	1.55	34.676	3492	27.771	45.2	1.27	31.8	24.43	341.77	3.15	1515.
4063	1.53	34.687	3994	27.781	45.5	1.20	30.5	26.77	432.32	3.64	1524.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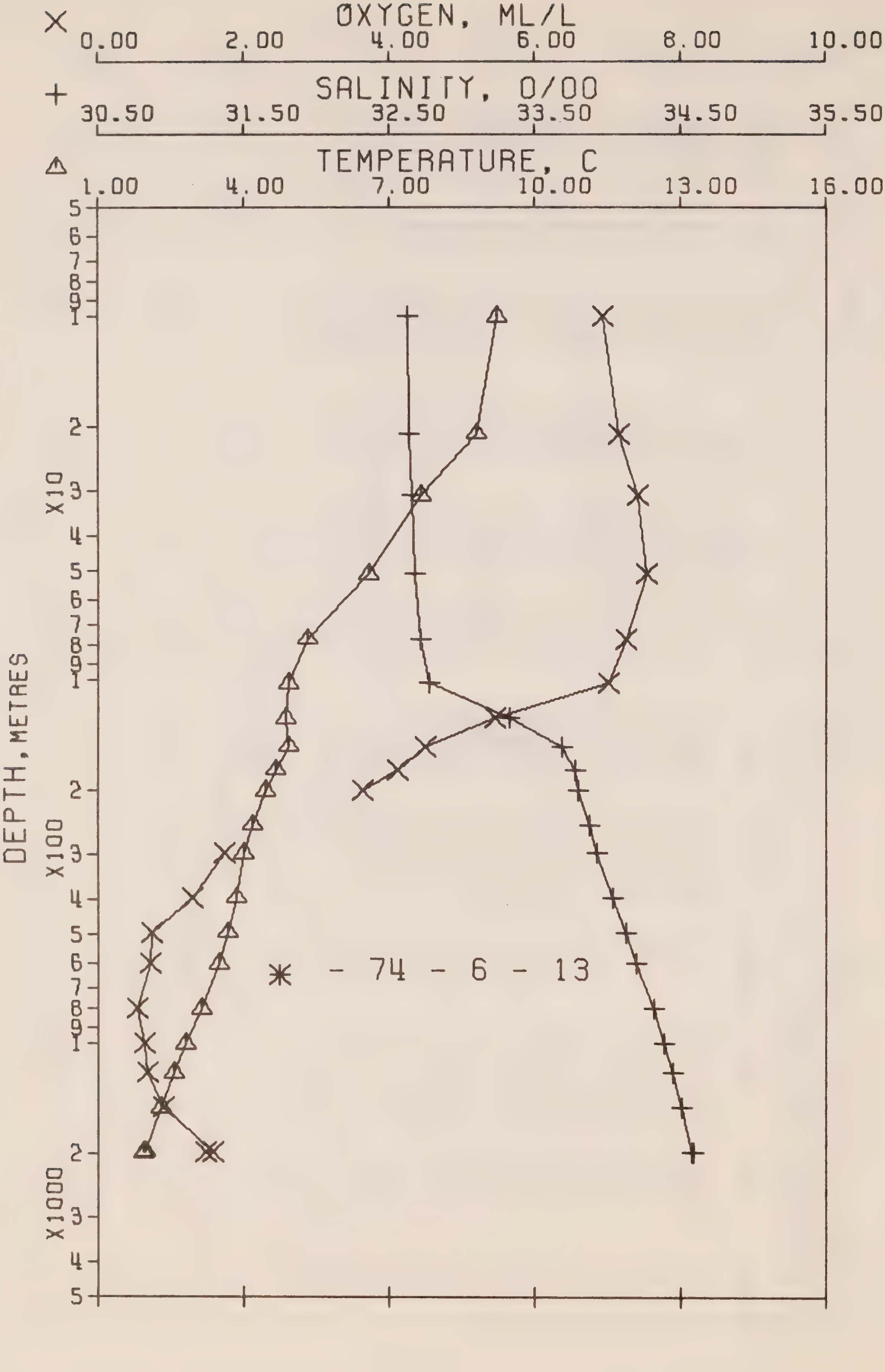
6.00
8.00
10.00
SALINITY, 0/00
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
- 74 - 6 - 11

OFFSHORE OCEANOGRAPHY GROUP   REFERENCE NO. 74- 6- 11   DATE 8/ 7/74
POSITION 49-51.0 N, 144-56.0 W   GMT 17.8
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	9.35	32.635	0	25.237	274.3	9.35	274.1	0.0	0.0	7.24	1485.
10	8.92	32.634	10	25.304	268.1	8.92	267.8	0.27	0.01	7.34	1484.
20	8.80	32.638	20	25.326	266.3	8.80	265.7	0.54	0.06	7.17	1483.
30	7.93	32.649	30	25.464	253.2	7.93	252.5	0.80	0.12	7.38	1480.
51	6.61	32.680	51	25.669	233.9	6.61	233.0	1.32	0.34	7.67	1475.
76	5.47	32.721	76	25.842	217.6	5.46	216.5	1.88	0.70	7.51	1471.
102	4.92	32.749	101	25.927	209.7	4.91	208.5	2.43	1.20	7.50	1469.
128	5.10	33.522	127	26.518	154.0	5.09	152.3	2.90	1.75	5.46	1472.
153	4.87	33.794	152	26.759	131.3	4.86	129.4	3.26	2.26	4.34	1471.
178	4.34	33.798	177	26.820	125.5	4.33	123.6	3.58	2.80	4.28	1470.
203	4.45	33.827	202	26.832	124.8	4.43	122.5	3.89	3.41	3.53	1470.
255	4.11	33.875	253	26.906	118.1	4.09	115.5	4.52	4.88	2.48	1470.
305	4.00	33.935	303	26.964	112.9	3.98	109.9	5.10	6.54	2.05	1470.
407	3.87	34.020	404	27.045	106.0	3.84	102.2	6.21	10.59	1.42	1472.
508	3.70	34.122	504	27.143	97.4	3.66	92.8	7.24	15.37	0.96	1473.
607	3.53	34.192	602	27.216	91.1	3.49	85.9	8.17	20.67	1.03	1474.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6.00
8.00
10.00
SALINITY, 0/00
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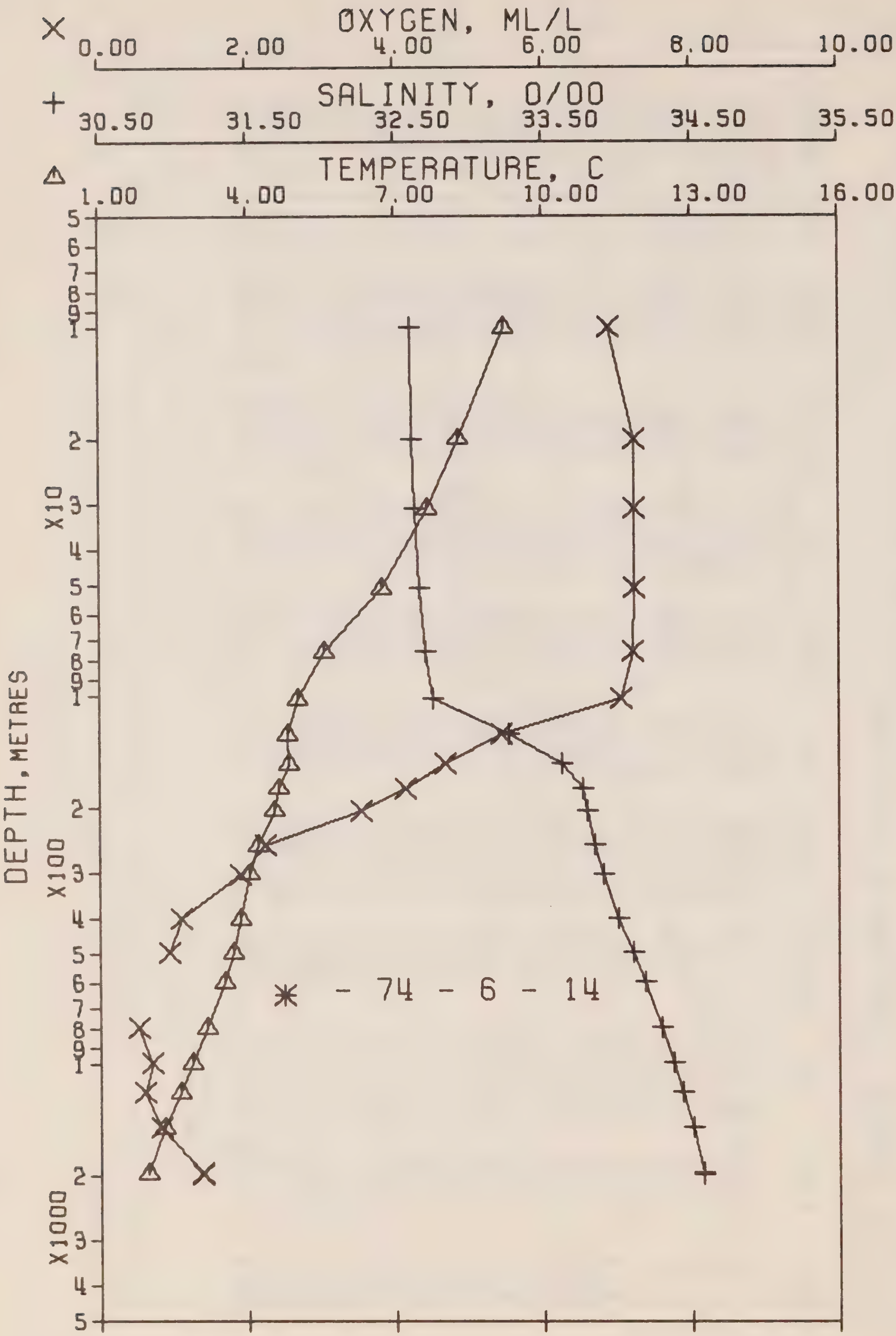
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
✳ - 74 - 6 - 13

OFFSHORE OCEANOGRAPHY GROUP REFERENCE NO. 74- 6- 13 DATE 12/ 7/74
POSITION 49-57.0 N, 145-28.0 W GMT 18.0
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	9.28	32.635	0	25.248	273.3	9.28	273.1	0.0	0.0	7.16	1485.
10	9.23	32.634	10	25.255	272.8	9.23	272.4	0.27	0.01	6.94	1485.
21	8.80	32.642	21	25.329	266.0	8.80	265.4	0.57	0.06	7.16	1483.
31	7.66	32.656	31	25.508	249.0	7.66	248.3	0.83	0.13	7.41	1479.
51	6.59	32.678	51	25.670	233.8	6.59	232.9	1.32	0.33	7.55	1475.
77	5.33	32.717	77	25.855	216.3	5.32	215.3	1.90	0.72	7.26	1471.
103	4.92	32.777	102	25.949	207.6	4.91	206.4	2.44	1.22	7.01	1469.
128	4.88	33.329	127	26.390	166.1	4.87	164.4	2.91	1.77	5.47	1470.
153	4.92	33.691	152	26.672	139.6	4.91	137.7	3.29	2.31	4.50	1471.
177	4.66	33.779	176	26.771	130.4	4.65	128.3	3.62	2.86	4.13	1471.
202	4.45	33.802	201	26.812	126.6	4.44	124.4	3.94	3.48	3.65	1470.
252	4.17	33.881	250	26.904	118.3	4.15	115.7	4.54	4.88		1470.
301	3.99	33.930	299	26.961	113.1	3.97	110.2	5.12	6.49	1.75	1470.
399	3.86	34.043	396	27.064	104.1	3.83	100.3	6.18	10.28	1.31	1471.
499	3.68	34.127	495	27.149	96.8	3.64	92.3	7.18	14.87	0.75	1472.
608	3.49	34.204	603	27.229	89.8	3.45	84.7	8.20	20.60	0.73	1474.
808	3.13	34.319	801	27.355	78.8	3.07	72.6	9.88	32.73	0.53	1475.
1011	2.81	34.392	1001	27.442	71.3	2.74	64.2	11.39	46.76	0.63	1478.
1213	2.57	34.450	1201	27.509	65.5	2.49	57.8	12.77	62.43	0.68	1480.
1518	2.28	34.509	1501	27.581	59.4	2.18	50.9	14.66	88.76	0.89	1484.
2014	1.95	34.585	1989	27.668	52.1	1.81	42.5	17.58	141.88	1.57	1491.
2024	1.94	34.593	1999	27.675	51.4	1.80	41.8	17.64	142.96	1.47	1491.


OXYGEN, ML/L
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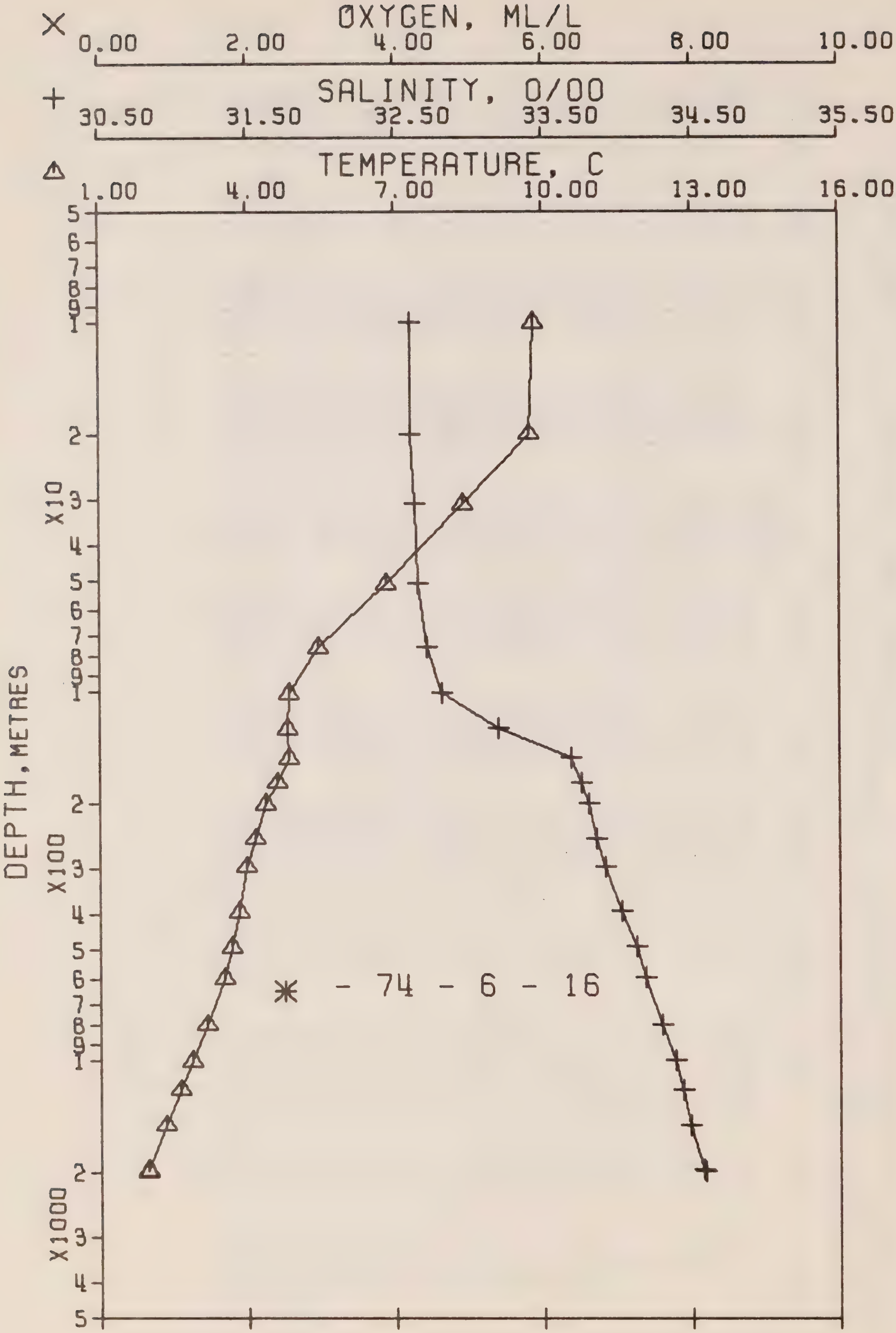
6.00
8.00
10.00
SALINITY, 0/00
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 74 - 6 - 14

OFFSHORE OCEANOGRAPHY GROUP REFERENCE NO. 74- 6- 14 DATE 16/ 7/74
POSITION 50-12.0 N, 145-14.0 W GMT 17.8
HYDROGRAPHIC CAST DATA

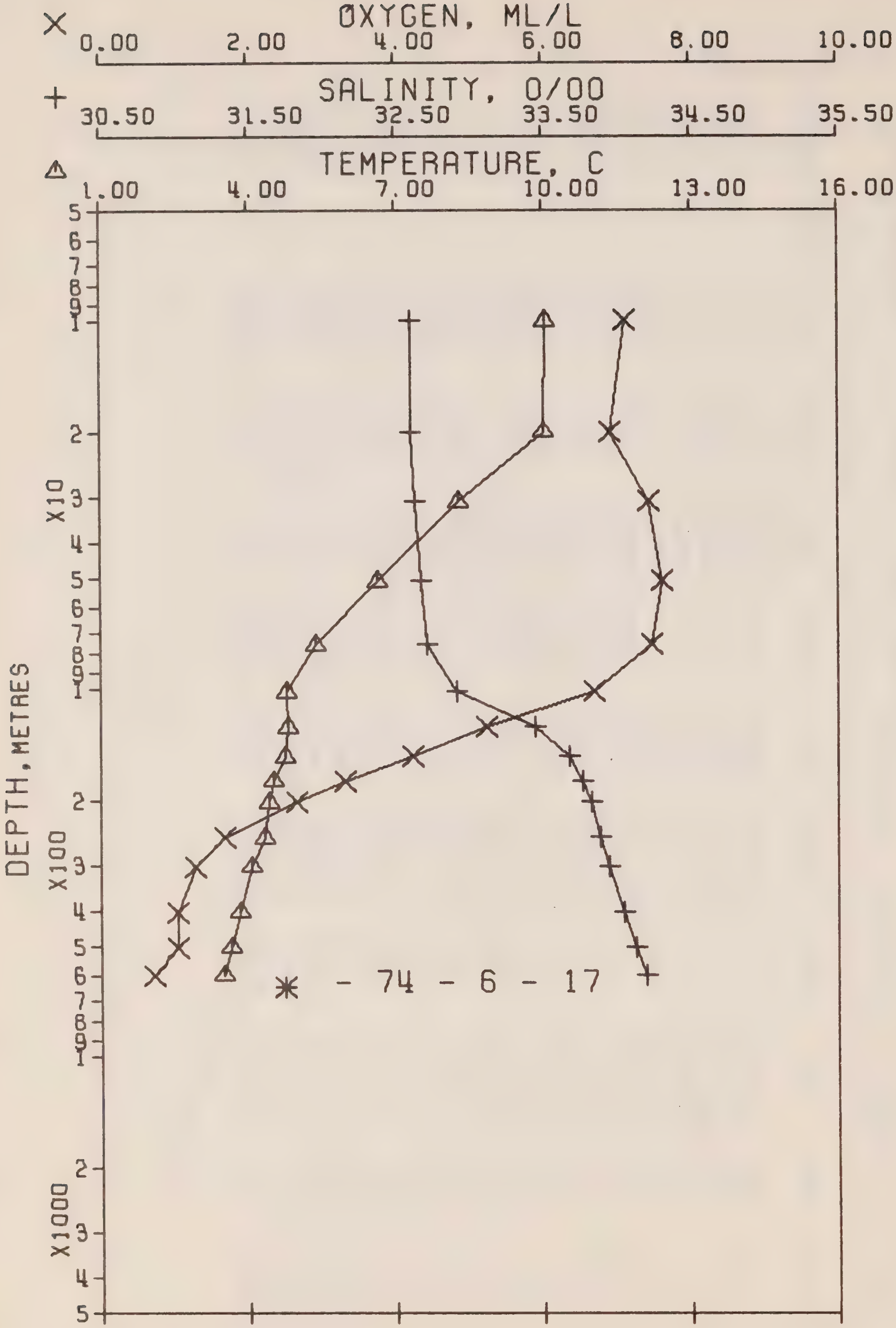
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	10.46	32.634	0	25.053	291.9	10.46	291.7	0.0	0.0	6.80	1489.
10	9.21	32.607	10	25.238	274.5	9.21	274.1	0.28	0.01	6.90	1485.
20	8.28	32.617	20	25.388	260.3	8.28	259.8	0.55	0.06	7.24	1481.
31	7.66	32.639	31	25.495	250.3	7.66	249.6	0.84	0.13	7.25	1479.
51	6.74	32.669	51	25.644	236.3	6.74	235.4	1.32	0.34	7.25	1476.
76	5.55	32.713	76	25.827	219.1	5.54	218.1	1.90	0.71	7.22	1471.
103	5.02	32.758	102	25.923	210.2	5.01	208.9	2.46	1.23	7.06	1470.
128	4.81	33.270	127	26.351	169.7	4.80	168.2	2.94	1.79	5.45	1470.
154	4.84	33.634	153	26.636	143.0	4.83	141.1	3.35	2.37	4.69	1471.
179	4.63	33.774	178	26.770	130.5	4.62	128.4	3.69	2.95	4.15	1471.
205	4.54	33.801	204	26.801	127.7	4.52	125.4	4.03	3.61	3.53	1471.
256	4.20	33.851	254	26.877	120.8	4.18	118.2	4.65	5.08	2.23	1470.
306	4.02	33.906	304	26.939	115.3	4.00	112.2	5.25	6.79	1.90	1470.
405	3.86	34.011	402	27.039	106.5	3.83	102.7	6.34	10.76	1.10	1472.
501	3.71	34.110	497	27.133	98.4	3.67	93.8	7.32	15.30	0.94	1473.
603	3.53	34.193	598	27.216	91.0	3.49	85.8	8.29	20.72		1474.
801	3.17	34.304	794	27.339	80.4	3.11	74.1	9.98	32.81	0.51	1476.
1002	2.85	34.381	992	27.429	72.5	2.78	65.4	11.50	46.83	0.70	1478.
1202	2.61	34.440	1190	27.498	66.6	2.53	58.9	12.89	62.46	0.59	1480.
1506	2.30	34.509	1489	27.579	59.6	2.20	51.1	14.80	88.74	0.82	1484.
1999	1.97	34.582	1975	27.664	52.5	1.83	42.8	17.52	137.36	1.37	1491.
2010	1.97	34.583	1985	27.665	52.5	1.83	42.7	17.57	138.45	1.38	1491.



OXYGEN, ML/L
0.00
2.00
4.00
6.00
8.00
10.00
SALINITY, O/OO
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 74 - 6 - 16

OFFSHORE OCEANOGRAPHY GROUP REFERENCE NO. 74- 6- 16 DATE 20/ 7/74
POSITION 49-54.0 N, 145-30.0 W GMT 17.8
HYDROGRAPHIC CAST DATA

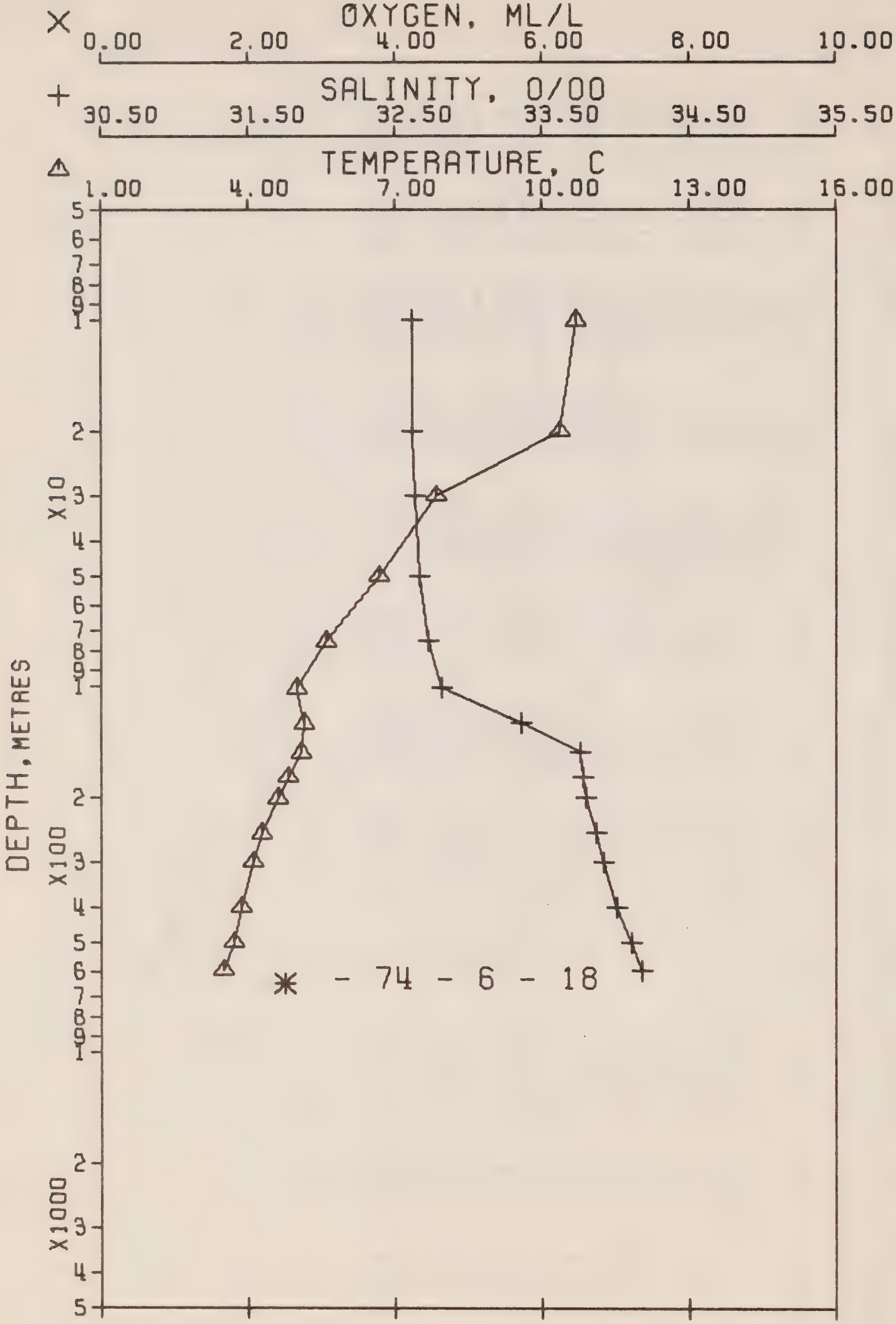
PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	9.85	32.613	0	25.139	283.7	9.85	283.4	0.0	0.0		1487.
10	9.82	32.613	10	25.144	283.4	9.82	283.0	0.29	0.01		1487.
20	9.74	32.614	20	25.158	282.3	9.74	281.6	0.57	0.06		1487.
31	8.37	32.636	31	25.389	260.4	8.37	259.6	0.87	0.14		1482.
51	6.82	32.661	51	25.627	238.0	6.82	237.0	1.37	0.35		1476.
76	5.44	32.718	76	25.843	217.5	5.43	216.4	1.94	0.72		1471.
102	4.84	32.818	101	25.990	203.7	4.83	202.5	2.47	1.20		1469.
127	4.80	33.199	126	26.296	174.9	4.79	173.4	2.95	1.76		1470.
152	4.85	33.688	151	26.678	139.0	4.84	137.2	3.34	2.32		1471.
177	4.60	33.761	176	26.763	131.1	4.59	129.1	3.68	2.88		1471.
202	4.37	33.809	201	26.826	125.3	4.36	123.1	4.00	3.50		1470.
252	4.15	33.856	250	26.886	119.9	4.13	117.3	4.61	4.90		1470.
300	3.96	33.923	298	26.959	113.3	3.94	110.4	5.17	6.49		1470.
398	3.83	34.035	395	27.061	104.4	3.80	100.7	6.23	10.27		1471.
496	3.68	34.131	492	27.152	96.4	3.65	92.0	7.21	14.74		1472.
601	3.51	34.190	596	27.216	91.1	3.47	85.8	8.20	20.24		1474.
805	3.15	34.302	798	27.339	80.3	3.09	74.1	9.94	32.75		1475.
1003	2.86	34.387	998	27.433	72.2	2.79	65.1	11.48	46.95		1478.
1209	2.62	34.439	1197	27.496	66.8	2.54	59.1	12.88	62.73		1480.
1511	2.33	34.494	1494	27.564	61.1	2.23	52.4	14.80	89.37		1484.
2005	1.97	34.584	1981	27.665	52.4	1.83	42.7	17.63	140.16		1491.
2016	1.96	34.587	1991	27.669	52.1	1.82	42.4	17.68	141.25		1491.



OXYGEN, ML/L
0.00
2.00
4.00
6.00
8.00
10.00
SALINITY, 0/00
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 74 - 6 - 17

OFFSHORE OCEANOGRAPHY GROUP REFERENCE NO. 74- 6- 17 DATE 23/ 7/74
POSITION 49-55.0 N. 145-40.0 W GMT 17.9
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	10.06	32.610	0	25.102	287.2	10.06	287.0	0.0	0.0	7.42	1488.
10	10.05	32.606	10	25.100	287.6	10.05	287.2	0.29	0.01	7.11	1488.
20	10.03	32.609	20	25.106	287.2	10.03	286.6	0.58	0.06	6.93	1488.
31	8.28	32.642	31	25.407	258.7	8.28	257.9	0.88	0.14	7.43	1481.
51	6.65	32.683	51	25.667	234.2	6.65	233.3	1.37	0.35	7.61	1475.
76	5.38	32.724	76	25.855	216.4	5.37	215.3	1.94	0.71	7.48	1471.
103	4.78	32.922	102	26.079	195.3	4.77	194.1	2.48	1.21	6.71	1469.
128	4.82	33.451	127	26.493	156.2	4.81	154.7	2.92	1.73	5.24	1470.
154	4.75	33.676	153	26.679	138.8	4.74	137.0	3.30	2.28	4.24	1471.
179	4.50	33.768	178	26.779	129.5	4.49	127.5	3.64	2.85	3.32	1470.
204	4.43	33.826	203	26.833	124.7	4.41	122.4	3.96	3.47	2.66	1470.
256	4.32	33.892	254	26.897	119.0	4.30	116.3	4.59	4.94	1.68	1471.
306	4.06	33.951	304	26.971	112.3	4.04	109.3	5.17	6.61	1.29	1471.
407	3.82	34.047	404	27.072	103.5	3.79	99.7	6.25	10.55	1.04	1471.
507	3.65	34.130	503	27.155	96.3	3.61	91.7	7.25	15.20	1.05	1472.
606	3.50	34.203	601	27.227	90.0	3.46	84.8	8.17	20.42	0.71	1474.


X
ØXYGEN, ML/L
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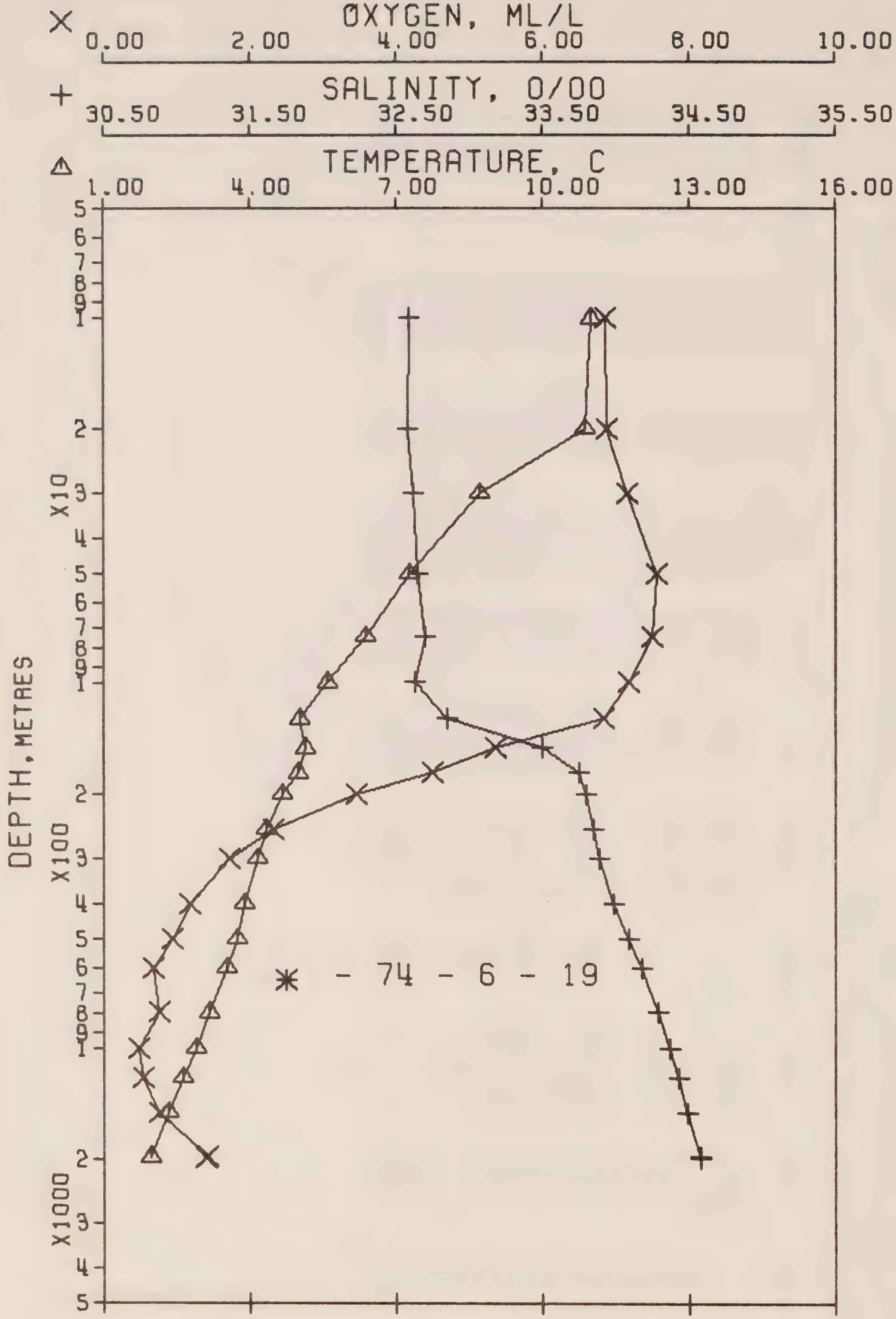
2.00
4.00
6.00
8.00
10.00
+
SALINITY, 0/00
30.50
31.50
32.50
33.50
34.50
35.50
△
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
∗ - 74 - 6 - 18

OFFSHORE OCEANOGRAPHY GROUP REFERENCE NO. 74- 6- 18 DATE 25/ 7/74
POSITION 50- 1.0 N, 144-54.0 W GMT 17.9
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	10.70	32.615	0	24.997	297.3	10.70	297.1	0.0	0.0		1490.
10	10.68	32.618	10	25.002	296.9	10.68	296.4	0.30	0.02		1490.
20	10.36	32.618	20	25.057	291.9	10.36	291.2	0.60	0.06		1489.
30	7.84	32.645	30	25.474	252.3	7.84	251.6	0.87	0.13		1480.
50	6.58	32.667	50	25.650	235.7	6.68	234.8	1.35	0.33		1476.
75	5.58	32.731	75	25.837	218.1	5.57	217.0	1.92	0.70		1472.
102	5.00	32.820	101	25.974	205.3	4.99	204.0	2.48	1.20		1470.
127	5.15	33.361	126	26.385	166.6	5.14	165.0	2.95	1.75		1472.
152	5.08	33.761	151	26.709	136.1	5.07	134.1	3.33	2.28		1472.
177	4.80	33.785	176	26.760	131.5	4.79	129.3	3.66	2.84		1471.
202	4.60	33.804	201	26.797	128.1	4.58	125.8	3.99	3.47		1471.
253	4.27	33.868	251	26.883	120.2	4.25	117.6	4.61	4.92		1471.
303	4.10	33.922	301	26.944	114.9	4.08	111.8	5.20	6.60		1471.
403	3.86	34.013	400	27.041	106.4	3.83	102.6	6.31	10.58		1472.
502	3.69	34.108	498	27.133	98.3	3.65	93.8	7.32	15.24		1473.
600	3.48	34.185	595	27.215	91.1	3.44	85.9	8.25	20.44		1473.



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SALINITY, 0/00
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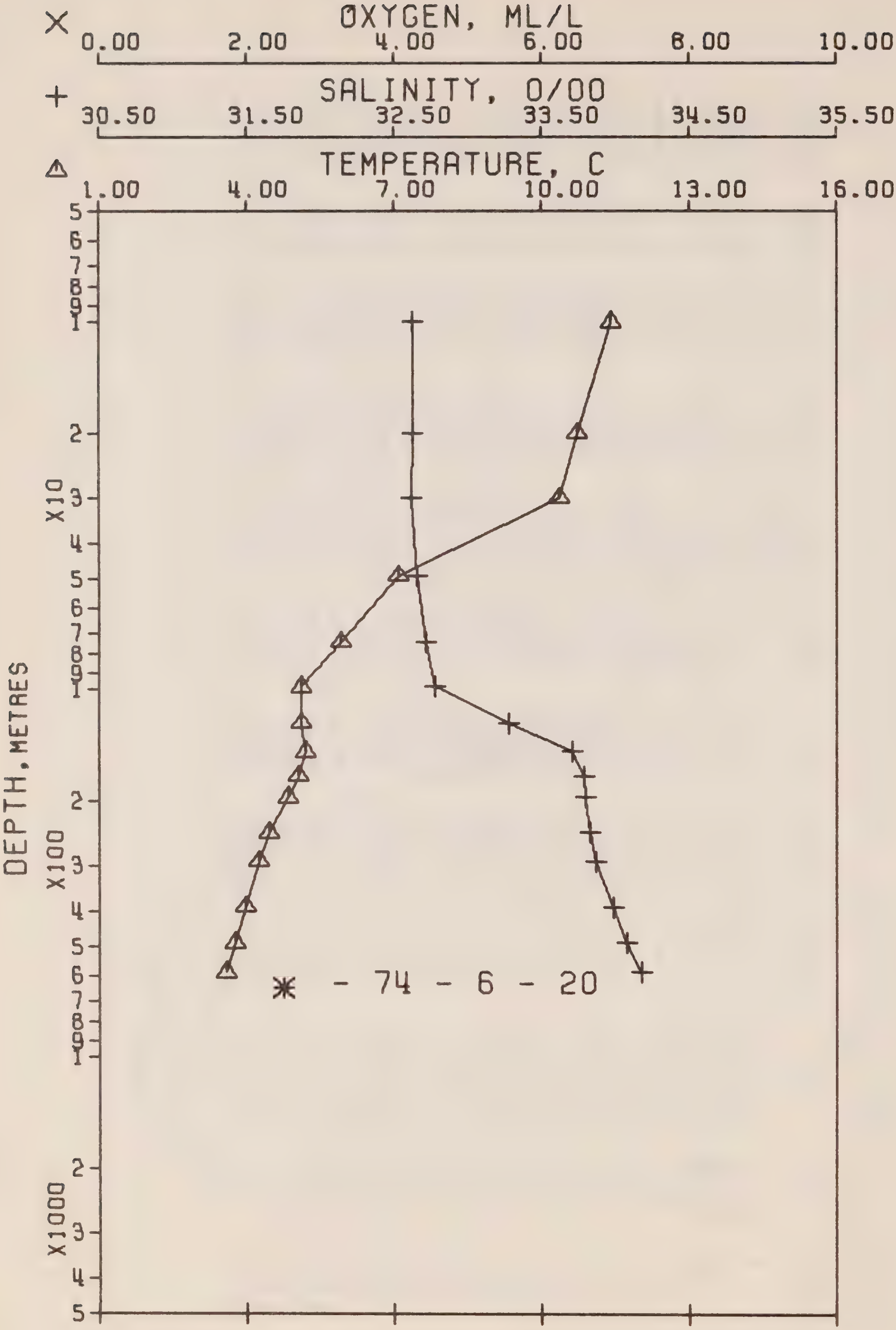
TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
* - 74 - 6 - 19

OFFSHORE OCEANOGRAPHY GROUP REFERENCE NO. 74- 6- 19 DATE 27/ 7/74
POSITION 49-59.0 N. 144-33.0 W GMT 17.7
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	11.27	32.593	0	24.879	308.4	11.27	308.2	0.0	0.0	7.00	1492.
10	11.00	32.588	10	24.923	304.5	11.00	304.0	0.31	0.02	6.86	1491.
20	10.86	32.583	20	24.944	302.7	10.86	302.1	0.62	0.06	6.88	1491.
30	8.71	32.619	30	25.325	266.6	8.71	265.8	0.90	0.14	7.16	1483.
50	7.27	32.653	50	25.560	244.4	7.27	243.4	1.41	0.34	7.56	1478.
74	6.38	32.697	74	25.712	230.1	6.37	228.9	1.98	0.71	7.49	1475.
100	5.60	32.633	99	25.757	225.9	5.59	224.6	2.55	1.22	7.18	1472.
126	5.01	32.847	125	25.994	203.6	5.00	202.0	3.12	1.87	6.83	1470.
151	5.14	33.503	150	26.498	156.1	5.13	154.2	3.57	2.51	5.37	1472.
176	4.99	33.753	175	26.713	136.0	4.98	133.8	3.94	3.11	4.50	1472.
201	4.66	33.797	200	26.785	129.3	4.64	127.0	4.27	3.75	3.45	1471.
252	4.34	33.851	250	26.862	122.2	4.32	119.6	4.90	5.21	2.33	1471.
303	4.14	33.891	301	26.915	117.6	4.12	114.6	5.51	6.95	1.72	1471.
403	3.89	33.994	400	27.022	108.1	3.86	104.3	6.64	11.01	1.19	1472.
502	3.73	34.090	498	27.115	100.1	3.69	95.5	7.67	15.76	0.93	1473.
604	3.53	34.184	599	27.209	91.7	3.49	86.5	8.65	21.26	0.69	1474.
803	3.17	34.293	796	27.330	81.2	3.11	74.9	10.36	33.53	0.76	1476.
1005	2.89	34.374	995	27.420	73.4	2.82	66.3	11.91	47.83	0.49	1478.
1206	2.63	34.433	1194	27.490	67.4	2.55	59.5	13.32	63.77	0.54	1480.
1511	2.31	34.491	1494	27.564	61.1	2.21	52.5	15.27	90.73	0.77	1484.
2001	1.97	34.577	1977	27.660	52.9	1.83	43.2	18.08	141.25	1.41	1491.
2012	1.96	34.580	1987	27.663	52.6	1.82	42.9	18.14	142.35	1.40	1491.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+ SALINITY, 0/00
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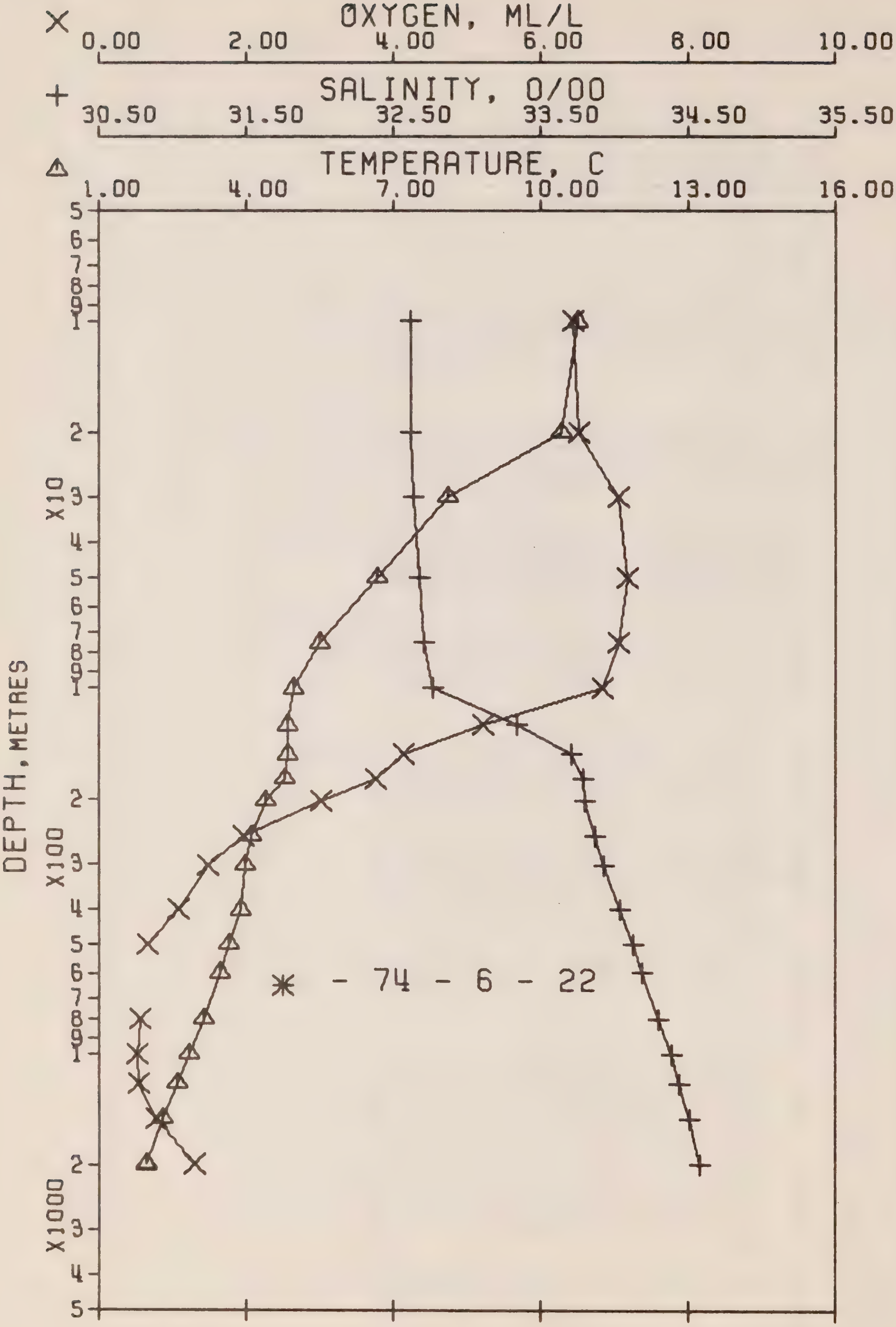
△ TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
* - 74 - 6 - 20

OFFSHORE OCEANOGRAPHY GROUP   REFERENCE NO. 74- 6- 20   DATE 29/ 7/74
POSITION 49-51.0 N, 144-42.0 W   GMT 17.8
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	11.68	32.624	0	24.829	313.3	11.68	313.0	0.0	0.0		1493.
10	11.41	32.628	10	24.881	308.5	11.41	308.0	0.31	0.02		1493.
20	10.71	32.628	20	25.005	296.9	10.71	296.2	0.62	0.06		1490.
30	10.37	32.625	30	25.061	291.7	10.37	290.8	0.91	0.14		1489.
49	7.10	32.664	49	25.592	241.2	7.10	240.4	1.43	0.34		1477.
74	5.91	32.725	74	25.793	222.4	5.90	221.2	2.00	0.71		1473.
99	5.10	32.782	98	25.933	209.1	5.09	207.9	2.52	1.17		1470.
124	5.10	33.281	123	26.327	172.0	5.09	170.4	3.01	1.72		1471.
148	5.21	33.715	147	26.658	141.0	5.20	139.0	3.38	2.23		1473.
172	5.05	33.738	171	26.734	134.0	5.04	131.8	3.71	2.77		1472.
197	4.84	33.802	196	26.769	130.8	4.82	128.4	4.04	3.40		1472.
246	4.44	33.831	244	26.836	124.8	4.42	122.1	4.66	4.79		1471.
294	4.25	33.869	292	26.886	120.3	4.23	117.3	5.25	6.43		1471.
392	3.96	33.990	389	27.012	109.1	3.93	105.3	6.38	10.35		1472.
491	3.76	34.083	487	27.106	100.9	3.73	96.3	7.41	15.01		1473.
592	3.59	34.177	587	27.198	92.8	3.55	87.6	8.39	20.40		1474.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10.00
SALINITY, 0/00
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31.50
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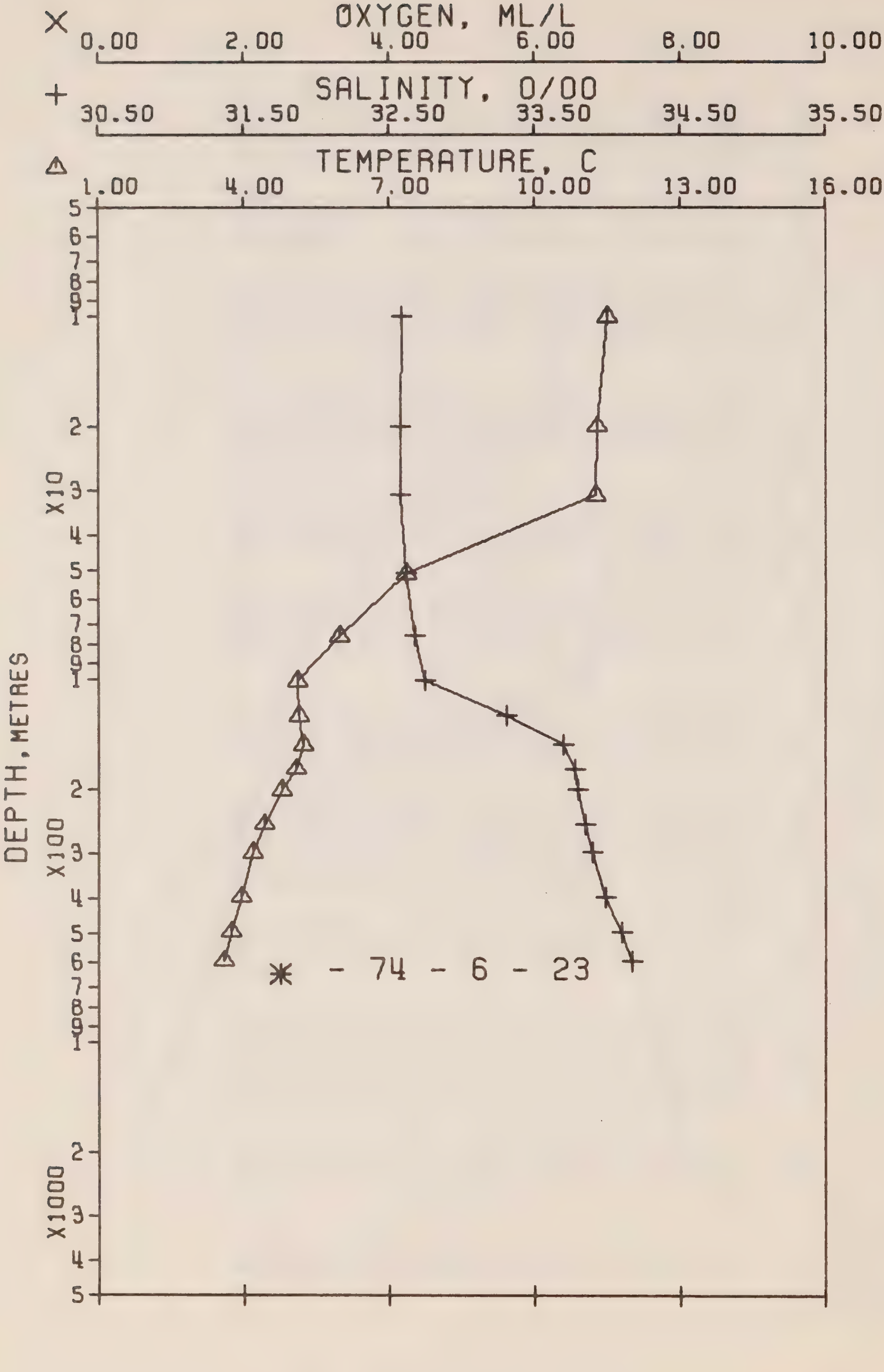
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 74 - 6 - 22

OFFSHORE OCEANOGRAPHY GROUP REFERENCE NO. 74- 6- 22 DATE 2/ 8/74
POSITION 50-13.0 N, 145-58.0 W GMT 17.7
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	10.77	32.621	0	24.989	298.0	10.77	297.8	0.0	0.0	6.45	1490.
10	10.76	32.620	10	24.990	298.0	10.76	297.6	0.30	0.02	6.43	1490.
20	10.41	32.622	20	25.052	292.4	10.41	291.7	0.60	0.06	6.52	1489.
30	8.10	32.636	30	25.429	256.6	8.10	255.9	0.88	0.13	7.06	1481.
50	6.66	32.682	50	25.664	234.3	6.66	233.5	1.36	0.33	7.18	1475.
75	5.49	32.715	75	25.835	218.2	5.48	217.2	1.93	0.70	7.05	1471.
101	4.95	32.770	100	25.940	208.4	4.94	207.3	2.47	1.18	6.84	1469.
127	4.84	33.339	126	26.402	164.9	4.83	163.3	2.96	1.75	5.22	1470.
152	4.83	33.712	151	26.699	137.0	4.82	135.1	3.33	2.28	4.14	1471.
177	4.79	33.787	176	26.763	131.2	4.78	129.1	3.67	2.84	3.76	1471.
203	4.38	33.802	202	26.819	126.0	4.37	123.7	4.01	3.50	3.03	1470.
254	4.09	33.875	252	26.908	117.9	4.07	115.3	4.62	4.93	1.96	1470.
305	3.97	33.935	303	26.967	112.6	3.95	109.6	5.21	6.61	1.49	1470.
405	3.89	34.036	402	27.056	105.0	3.86	101.1	6.30	10.55	1.08	1472.
502	3.65	34.132	498	27.156	96.1	3.61	91.6	7.27	15.04	0.65	1472.
603	3.46	34.192	598	27.222	90.4	3.42	85.3	8.21	20.34		1473.
805	3.13	34.302	798	27.341	80.1	3.07	73.9	9.93	32.67	0.57	1475.
1007	2.82	34.386	997	27.436	71.8	2.75	64.8	11.45	46.74	0.51	1478.
1207	2.60	34.444	1195	27.502	66.2	2.52	58.6	12.83	62.32	0.53	1480.
1511	2.28	34.511	1494	27.582	59.3	2.18	50.8	14.73	88.58	0.78	1484.
2009	1.96	34.585	1984	27.667	52.2	1.82	42.5	17.47	137.91	1.29	1491.
2019	1.95	34.585	1994	27.668	52.1	1.81	42.4	17.53	139.00	1.31	1491.



X OXYGEN, ML/L
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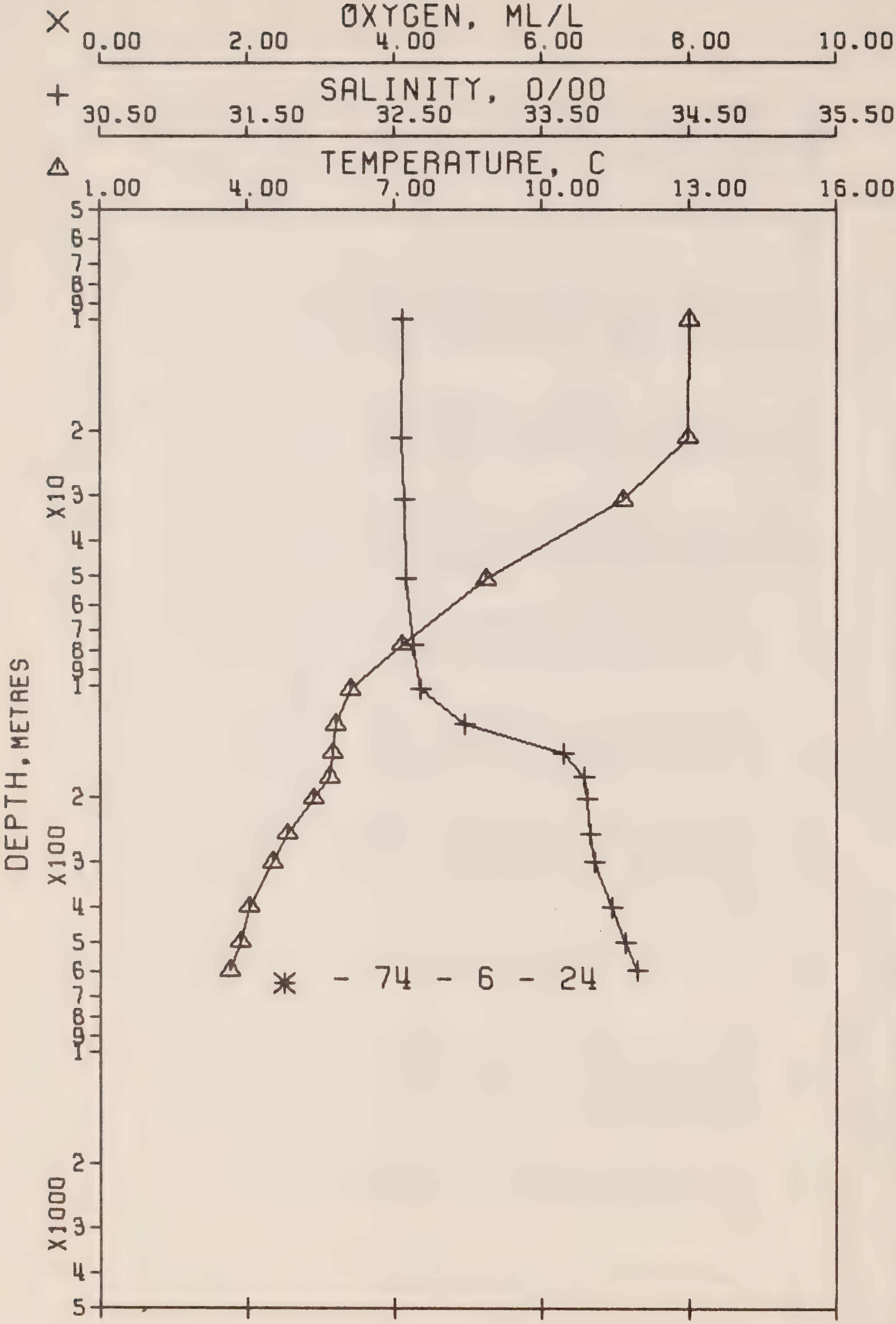
4.00
6.00
8.00
10.00
+ SALINITY, 0/00
30.50
31.50
32.50
33.50
34.50
35.50
△ TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 74 - 6 - 23

OFFSHORE OCEANOGRAPHY GROUP REFERENCE NO. 74- 6- 23 DATE 5/ 8/74
POSITION 49-50.0 N, 142-40.0 W GMT 5.3
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	11.50	32.588	0	24.834	312.8	11.50	312.6	0.0	0.0		1493.
10	11.50	32.586	10	24.832	313.1	11.50	312.7	0.31	0.02		1493.
20	11.28	32.584	20	24.870	309.7	11.28	309.1	0.63	0.06		1492.
31	11.25	32.584	31	24.876	309.5	11.25	308.5	0.97	0.15		1492.
51	7.35	32.622	51	25.525	247.7	7.35	246.7	1.54	0.39		1478.
76	5.99	32.681	76	25.748	226.6	5.98	225.4	2.12	0.77		1473.
102	5.10	32.755	101	25.911	211.2	5.09	209.9	2.68	1.28		1470.
127	5.13	33.310	126	26.347	170.2	5.12	168.6	3.16	1.84		1471.
152	5.22	33.699	151	26.644	142.3	5.21	140.4	3.55	2.39		1473.
177	5.09	33.782	176	26.725	135.0	5.08	132.7	3.89	2.97		1473.
202	4.77	33.801	201	26.776	130.2	4.75	127.8	4.23	3.61		1472.
252	4.42	33.853	250	26.855	123.0	4.40	120.2	4.85	5.06		1471.
301	4.19	33.899	299	26.916	117.6	4.17	114.4	5.45	6.73		1471.
400	3.95	33.995	397	27.017	108.7	3.92	104.8	6.56	10.73		1472.
499	3.73	34.099	495	27.122	99.3	3.69	94.8	7.59	15.43		1473.
599	3.58	34.169	594	27.192	93.3	3.54	88.1	8.55	20.81		1474.



OXYGEN, ML/L
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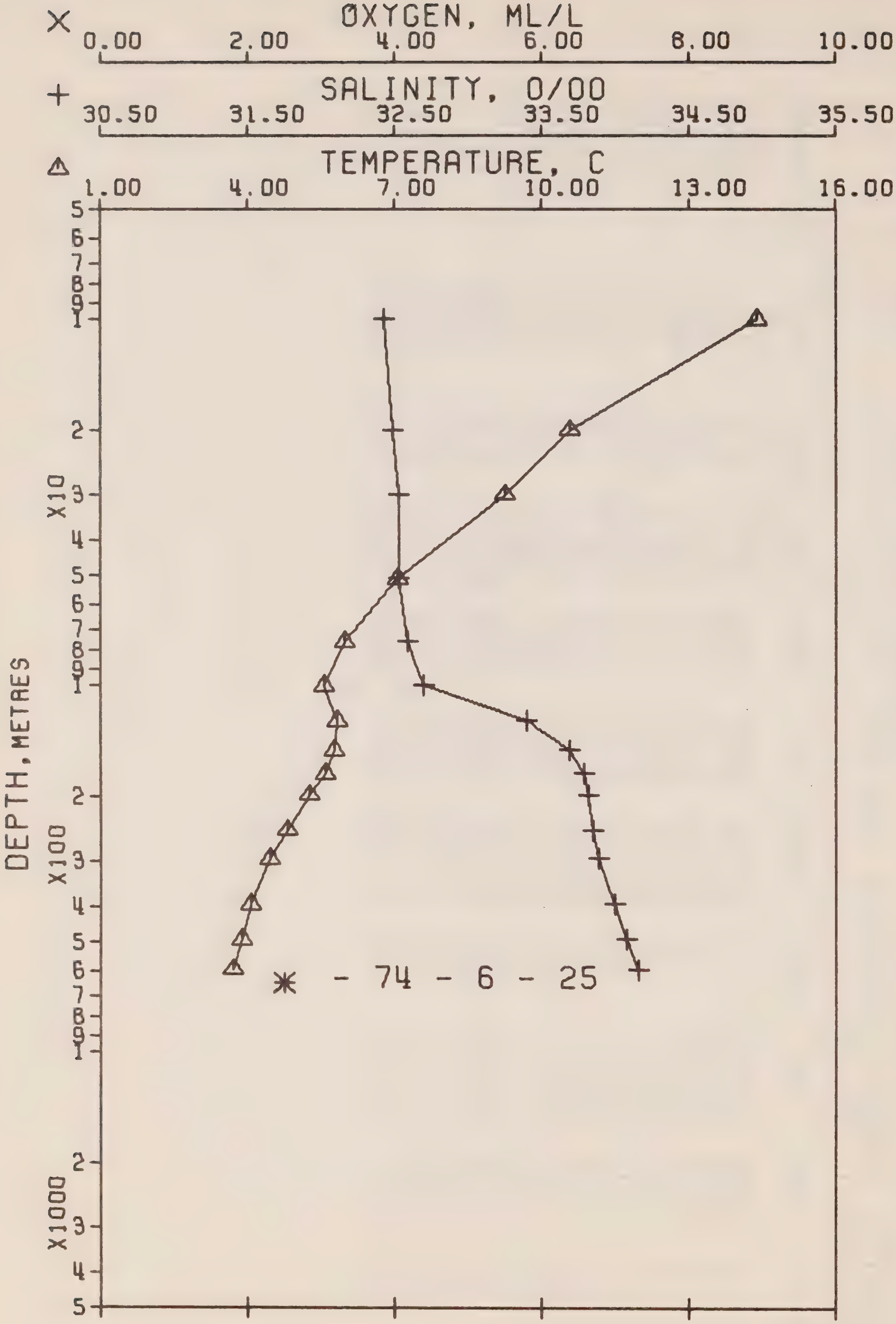
4.00
6.00
8.00
10.00
SALINITY, O/OO
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 74 - 6 - 24

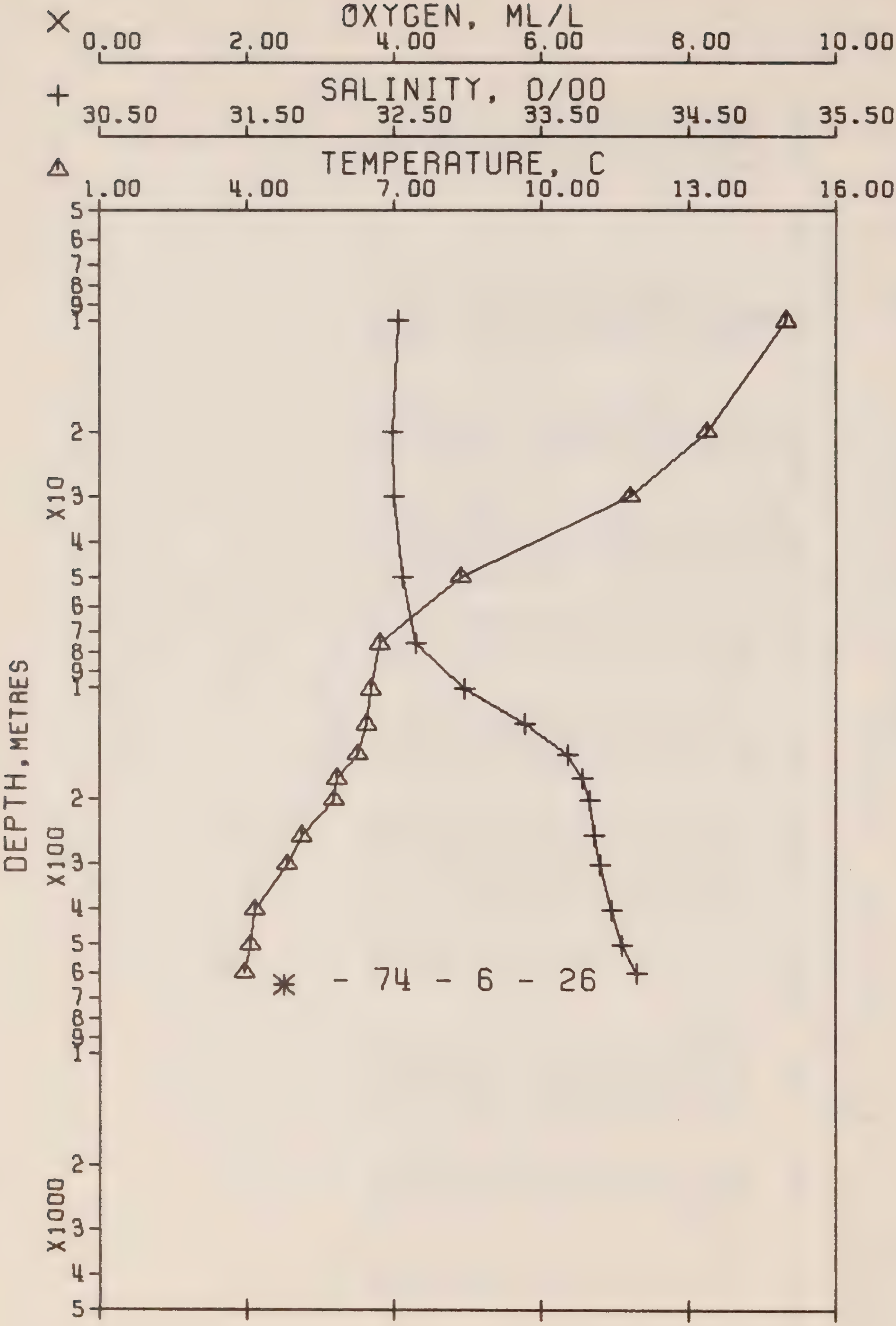
OFFSHORE OCEANOGRAPHY GROUP REFERENCE NO. 74- 6- 24 DATE 5/ 8/74
POSITION 49-31.0 N, 138-40.0 W GMT 19.0
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	12.99	32.552	0	24.524	342.2	12.99	342.0	0.0	0.0		1498.
10	12.99	32.559	10	24.530	341.9	12.99	341.5	0.34	0.02		1498.
21	12.97	32.555	21	24.530	342.1	12.97	341.4	0.72	0.08		1498.
31	11.64	32.566	31	24.791	317.5	11.64	316.5	1.06	0.17		1494.
51	8.87	32.581	51	25.270	272.1	8.86	270.9	1.65	0.41		1484.
77	7.16	32.634	77	25.560	244.7	7.15	243.4	2.31	0.85		1478.
103	6.10	32.632	102	25.736	228.1	6.09	226.7	2.91	1.40		1474.
128	5.81	32.977	127	26.004	202.9	5.80	201.1	3.46	2.04		1474.
153	5.73	33.647	152	26.542	152.2	5.72	150.0	3.90	2.68		1475.
178	5.68	33.791	177	26.662	141.1	5.67	138.6	4.26	3.29		1475.
203	5.36	33.810	202	26.715	136.2	5.34	133.5	4.61	3.97		1474.
254	4.80	33.830	252	26.796	128.9	4.78	125.9	5.28	5.52		1473.
304	4.51	33.864	302	26.854	123.7	4.49	120.3	5.92	7.33		1472.
403	4.04	33.976	400	26.993	111.0	4.01	107.1	7.08	11.51		1472.
503	3.86	34.073	499	27.088	102.7	3.82	98.0	8.14	16.43		1473.
603	3.63	34.154	598	27.176	95.0	3.59	89.6	9.13	21.99		1474.


ØXYGEN, ML/L
0.00
2.00
4.00
6.00
8.00
10.00
SALINITY, 0/00
30.50
31.50
32.50
33.50
34.50
35.50
TEMPERATURE, C
1.00
4.00
7.00
10.00
13.00
16.00
DEPTH, METRES
X10
X100
X1000
* - 74 - 6 - 25

OFFSHORE OCEANOGRAPHY GROUP REFERENCE NO. 74- 6- 25 DATE 6/ 8/74
POSITION 49-14.0 N, 134-40.0 W GMT 6.9
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	14.46	32.438	0	24.138	379.0	14.46	378.8	0.0	0.0		1503.
10	14.37	32.435	10	24.154	377.8	14.37	377.3	0.38	0.02		1502.
20	10.57	32.493	20	24.924	304.5	10.57	303.9	0.73	0.07		1490.
30	9.24	32.529	30	25.172	281.1	9.24	280.3	1.02	0.15		1485.
51	7.07	32.529	51	25.490	251.0	7.07	250.1	1.57	0.38		1477.
76	5.99	32.591	76	25.677	233.4	5.98	232.2	2.18	0.77		1473.
101	5.55	32.698	100	25.815	220.5	5.54	219.2	2.73	1.27		1472.
126	5.83	33.396	125	26.332	171.9	5.82	170.0	3.23	1.84		1474.
151	5.77	33.687	150	26.569	149.6	5.76	147.4	3.63	2.40		1475.
175	5.59	33.791	174	26.673	140.0	5.58	137.6	3.98	2.98		1475.
200	5.25	33.824	199	26.739	133.9	5.23	131.2	4.32	3.64		1474.
250	4.81	33.854	248	26.813	127.2	4.79	124.2	4.96	5.12		1473.
299	4.44	33.889	297	26.882	121.0	4.42	117.7	5.57	6.83		1472.
397	4.05	34.003	394	27.013	109.1	4.02	105.2	6.70	10.81		1472.
497	3.89	34.080	493	27.091	102.5	3.85	97.8	7.75	15.62		1473.
599	3.69	34.159	594	27.174	95.3	3.65	89.8	8.76	21.25		1474.



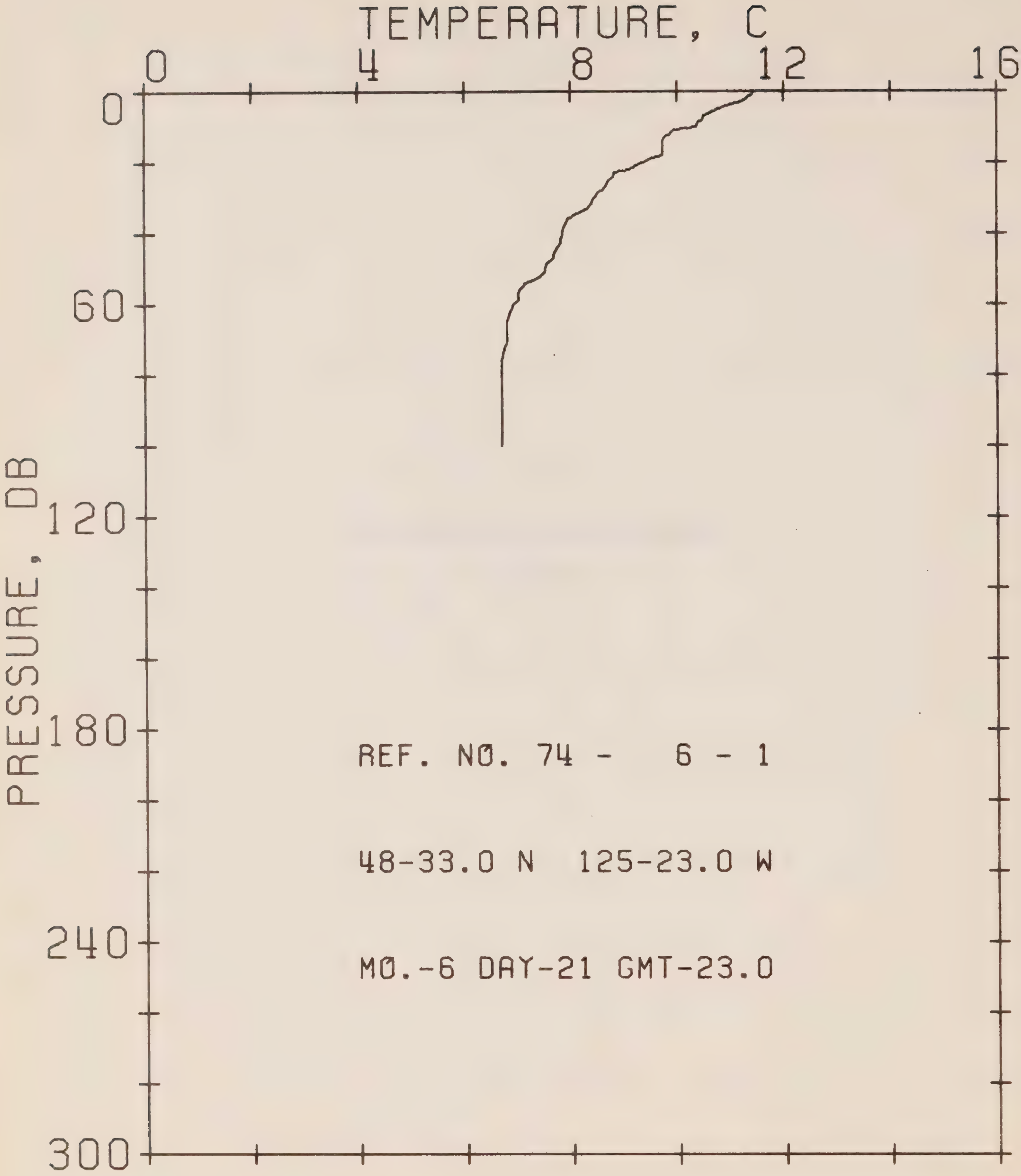
X OXYGEN, ML/L
0.00 2.00 4.00 6.00 8.00 10.00
+ SALINITY, 0/00
30.50 31.50 32.50 33.50 34.50 35.50
△ TEMPERATURE, C
1.00 4.00 7.00 10.00 13.00 16.00
DEPTH, METRES
X10
X100
X1000
* - 74 - 6 - 26

OFFSHORE OCEANOGRAPHY GROUP REFERENCE NO. 74- 6- 26 DATE 6/ 8/74
POSITION 49-57.0 N, 130-40.0 W GMT 19.3
HYDROGRAPHIC CAST DATA

PRESS	TEMP	SAL	DEPTH	SIGMA T	SVA	THETA	SVA (THETA)	DELTA D	POT. EN	OXY	SOUND
0	16.61*	32.525	0	23.732	417.8	16.61	417.6	0.0	0.0		1509.
10	14.99	32.527	10	24.094	383.6	14.99	383.0	0.40	0.02		1504.
20	13.37	32.492	20	24.403	354.3	13.37	353.6	0.77	0.08		1499.
30	11.81	32.496	30	24.706	325.6	11.81	324.7	1.11	0.16		1494.
50	8.36	32.557	50	25.329	266.4	8.35	265.3	1.71	0.41		1482.
76	6.71	32.655	76	25.637	237.3	6.70	236.1	2.36	0.83		1476.
102	6.51	32.979	101	25.918	211.0	6.50	209.4	2.92	1.34		1476.
127	6.44	33.393	126	26.253	179.5	6.43	177.5	3.41	1.91		1477.
153	6.24	33.680	152	26.504	156.0	6.23	153.6	3.85	2.53		1477.
178	5.82	33.780	177	26.636	143.6	5.80	141.1	4.22	3.17		1476.
203	5.77	33.829	202	26.681	139.6	5.75	136.8	4.58	3.86		1476.
255	5.12	33.865	253	26.787	129.9	5.10	126.7	5.27	5.47		1474.
305	4.81	33.902	303	26.852	124.2	4.79	120.6	5.91	7.30		1474.
407	4.14	33.976	404	26.983	112.1	4.11	108.1	7.11	11.65		1473.
507	4.07	34.054	503	27.052	106.5	4.03	101.5	8.20	16.74		1474.
605	3.94	34.150	600	27.141	98.7	3.90	92.9	9.21	22.43		1475.

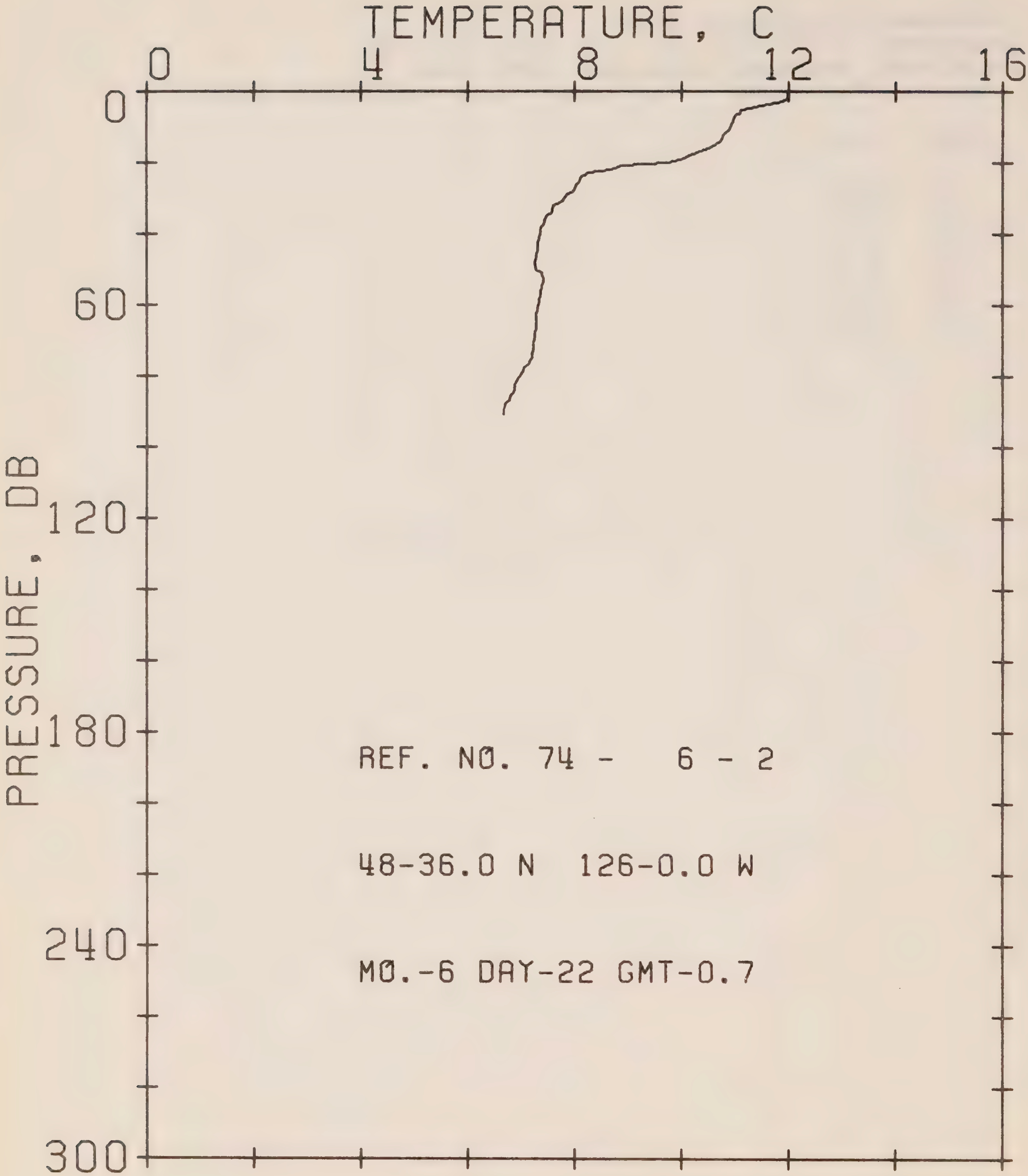
RESULTS OF STD OBSERVATIONS

(P-74-6)


TEMPERATURE, C
0
4
8
12
16
PRESSURE, DB
0
60
120
180
240
300
REF. NO. 74 - 6 - 1
48-33.0 N 125-23.0 W
MO.-6 DAY-21 GMT-23.0

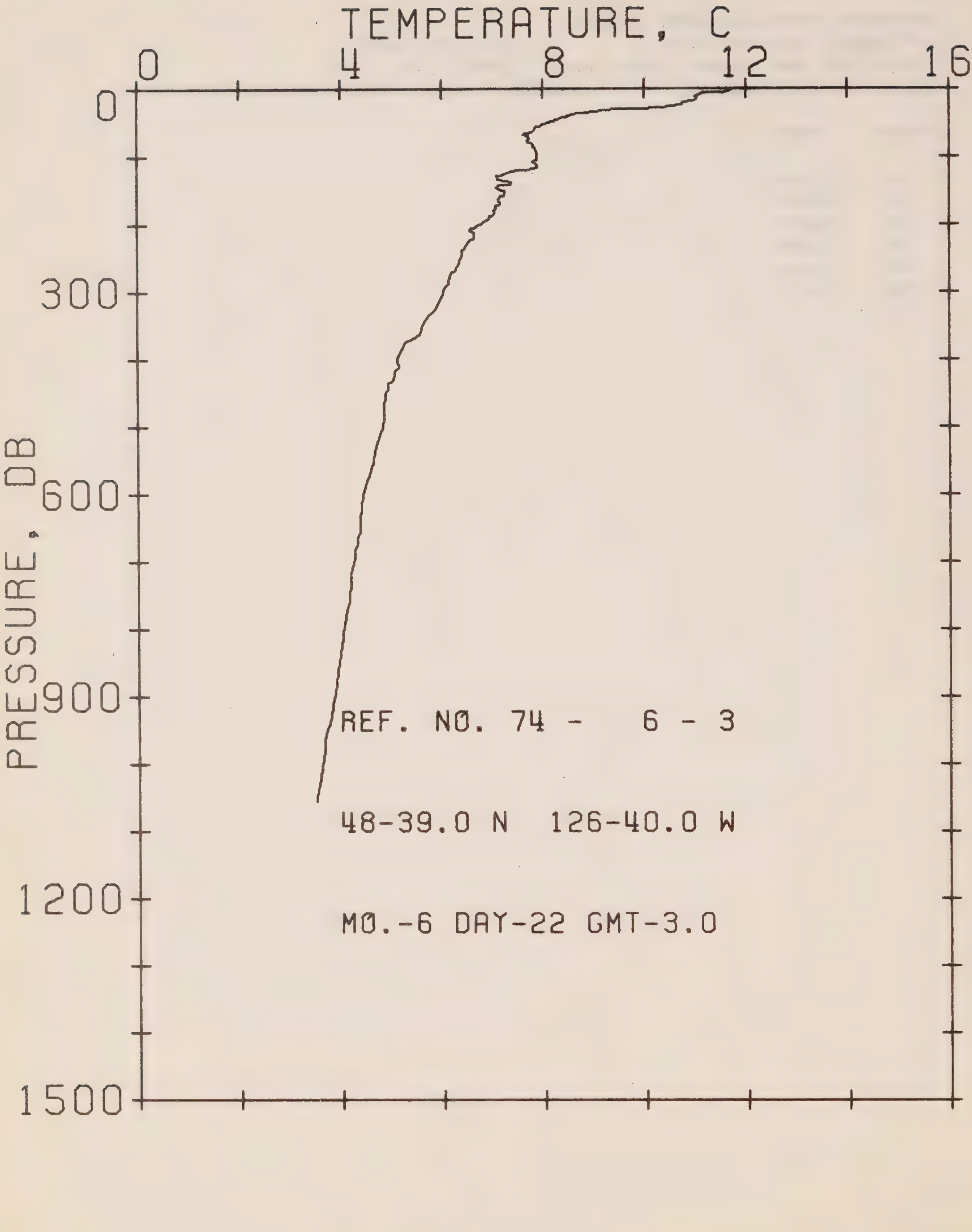
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6- 1   DATE 21/ 6/74
POSITION 48-33.0N, 125-23.0W   GMT 23.0
RESULTS OF STP CAST   65 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP
0	11.42
10	10.37
20	9.37
30	8.46
50	7.53
75	6.71
100	6.69


TEMPERATURE, C
0
4
8
12
16
0
60
120
180
240
300
PRESSURE, DB
REF. NO. 74 - 6 - 2
48-36.0 N 126-0.0 W
MO.-6 DAY-22 GMT-0.7

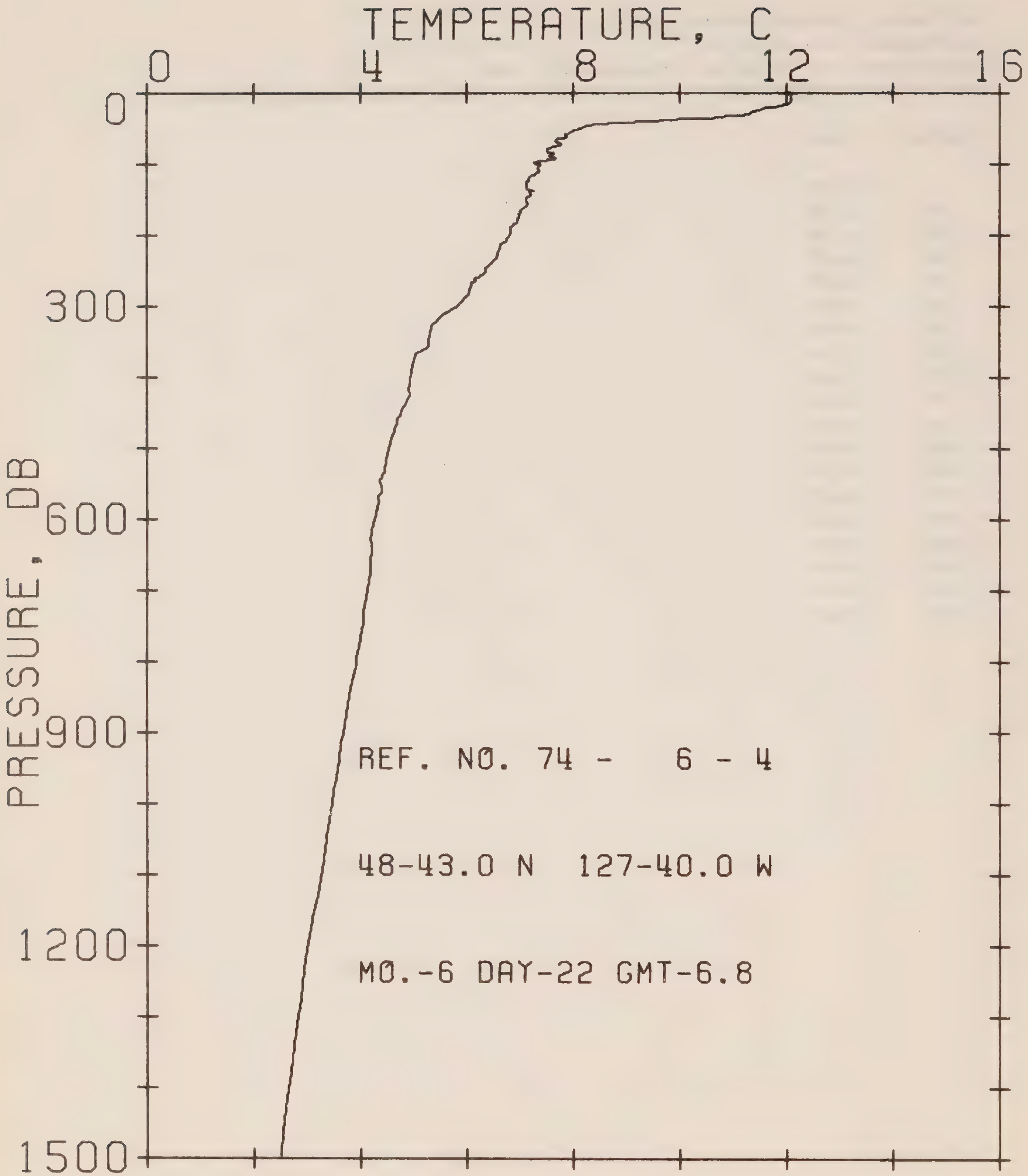
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6- 2 DATE 22/ 6/74
POSITION 48-36.0N, 126- 0.0W GMT 0.7
RESULTS OF STP CAST 69 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP
0	11.98
10	10.91
20	9.73
30	7.82
50	7.29
75	7.21


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 74 - 6 - 3
48-39.0 N 126-40.0 W
MO.-6 DAY-22 GMT-3.0

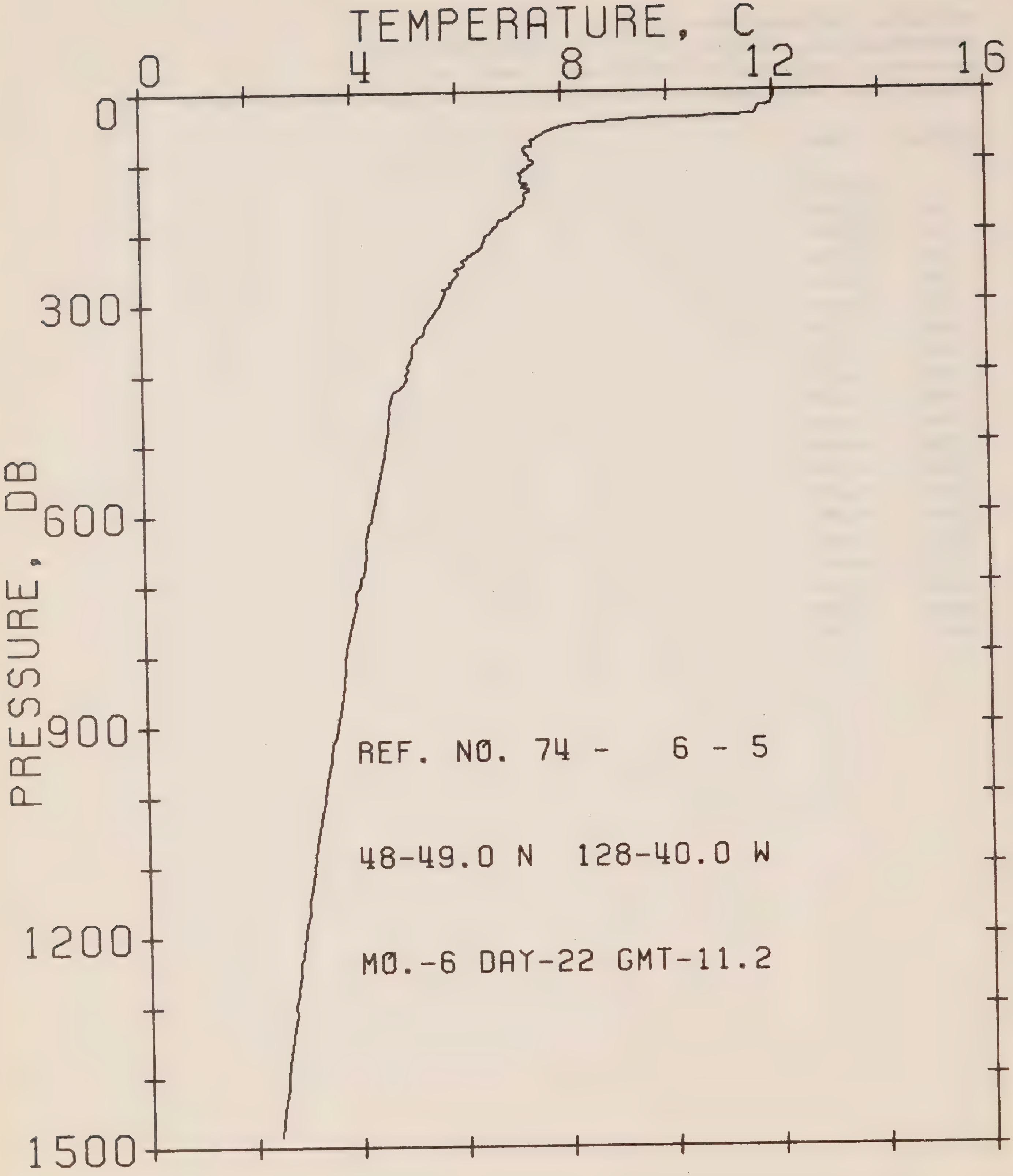
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6- 3 DATE 22/ 6/74
POSITION 48-39.0N, 126-40.0W GMT 3.0
RESULTS OF STP CAST 229 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP
0	11.74
10	11.04
20	10.76
30	9.37
50	8.07
75	7.73
100	7.88
125	7.24
150	7.24
175	7.05
200	6.75
225	6.55
250	6.37
300	6.02
400	5.12
500	4.83
600	4.44
800	4.04
1000	3.61


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 74 - 6 - 4
48-43.0 N 127-40.0 W
MO.-6 DAY-22 GMT-6.8

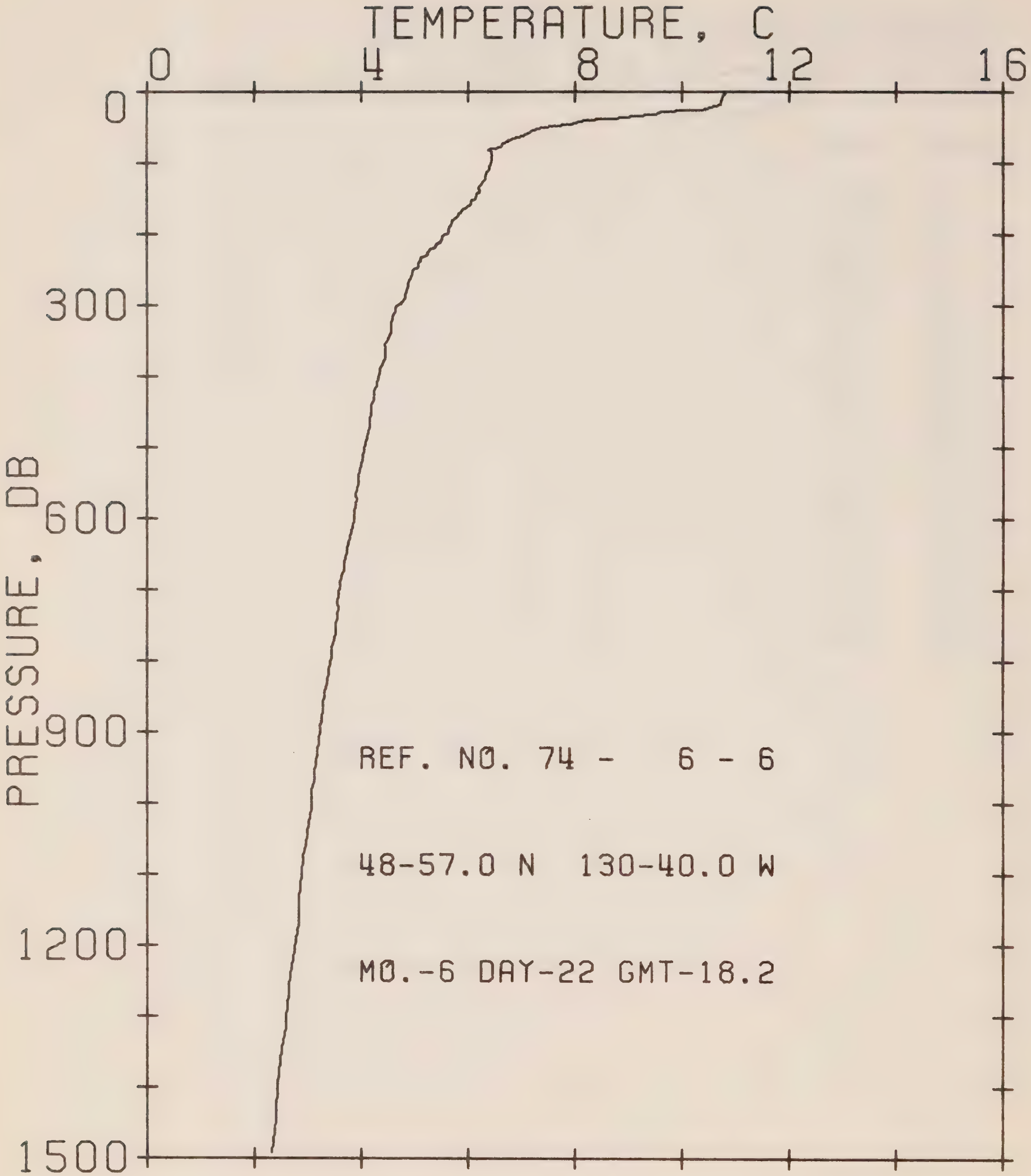
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6- 4 DATE 22/ 6/74
POSITION 48-43.0N, 127-40.0W GMT 6.8
RESULTS OF STP CAST 242 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP
0	12.07
10	12.07
20	11.60
30	11.28
50	8.09
75	7.69
100	7.33
125	7.11
150	7.11
175	6.98
200	6.80
225	6.60
250	6.34
300	5.82
400	4.95
500	4.54
600	4.27
800	3.93
1000	3.47
1200	3.01


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 74 - 6 - 5
48-49.0 N 128-40.0 W
MO.-6 DAY-22 GMT-11.2

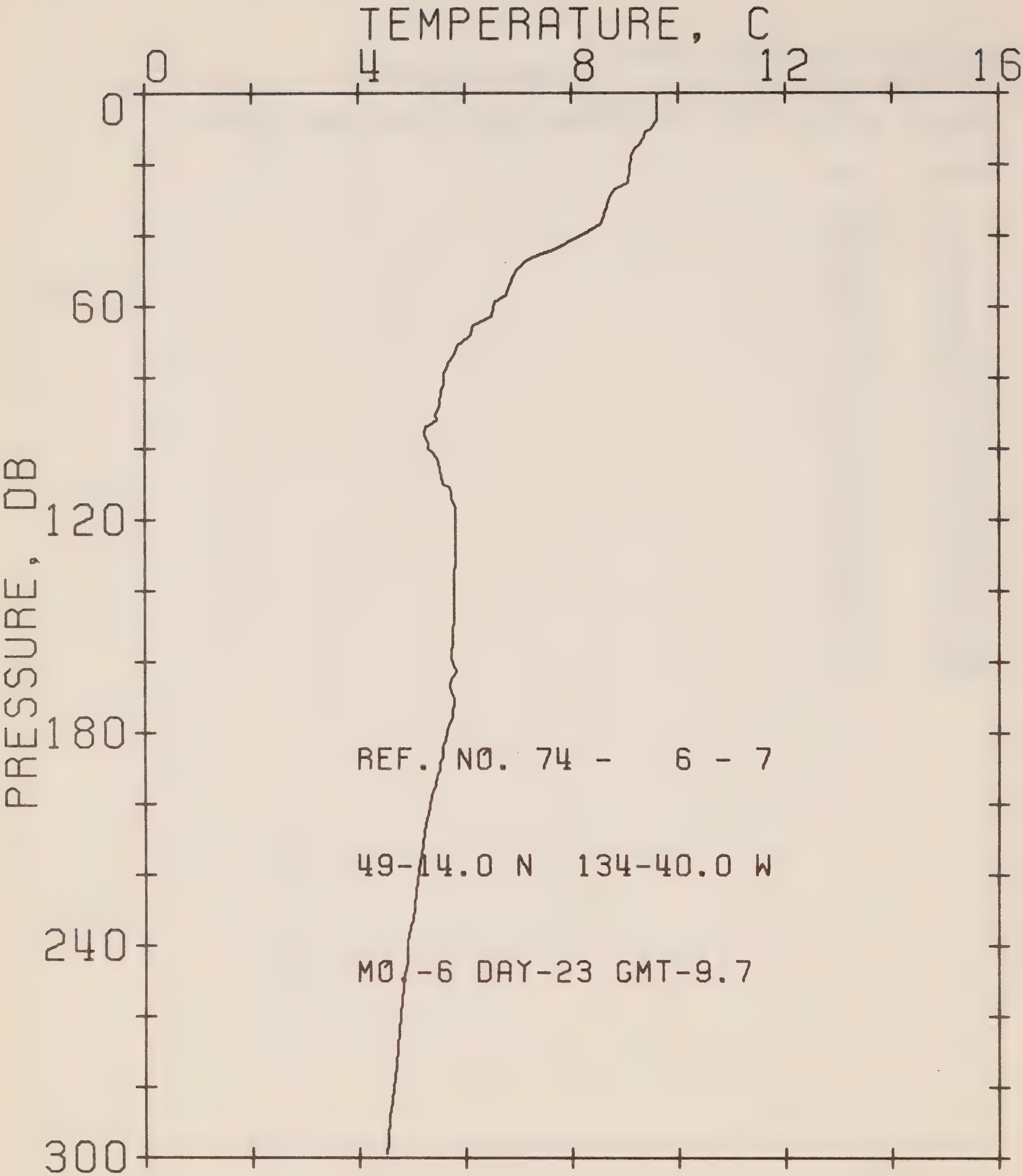
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6- 5 DATE 22/ 6/74
POSITION 48-49.0N. 128-40.0W GMT 11.2
RESULTS OF STP CAST 234 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP
0	12.02
10	12.02
20	11.90
30	11.68
50	8.00
75	7.43
100	7.47
125	7.22
150	7.29
175	7.01
200	6.64
225	6.39
250	6.02
300	5.68
400	5.00
500	4.60
600	4.31
800	3.79
1000	3.34
1200	2.92


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
PRESSURE, DB
REF. NO. 74 - 6 - 6
48-57.0 N 130-40.0 W
MO.-6 DAY-22 GMT-18.2

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6- 6 DATE 22/ 6/74
POSITION 48-57.0N, 130-40.0W GMT 18.2
RESULTS OF STP CAST 244 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP
0	10.80
10	10.74
20	10.65
30	9.52
50	7.35
75	6.63
100	6.43
125	6.30
150	6.14
175	5.78
200	5.58
225	5.22
250	4.99
300	4.67
400	4.32
500	4.05
600	3.86
800	3.43
1000	3.07
1200	2.76


TEMPERATURE, C
0
4
8
12
16
PRESSURE, DB
0
60
120
180
240
300
REF. NO. 74 - 6 - 7
49-14.0 N 134-40.0 W
MO.-6 DAY-23 GMT-9.7

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6- 7 DATE 23/ 6/74
POSITION 49-14.0N, 134-40.0W GMT 9.7
RESULTS OF STP CAST 105 POINTS TAKEN FROM ANALOG TRACE

PRESS	TEMP
0	9.60
10	9.48
20	9.11
30	8.69
50	6.97
75	5.74
100	5.31
125	5.82
150	5.78
175	5.75
200	5.35
225	5.06
250	4.84

BATHYTHERMOGRAPH OBSERVATIONS

(P-74-6)

BATHYTHERMOGRAPH OBSERVATIONS

This section includes all B.T.'s taken on Line P outbound and inbound, and one a day on station P .

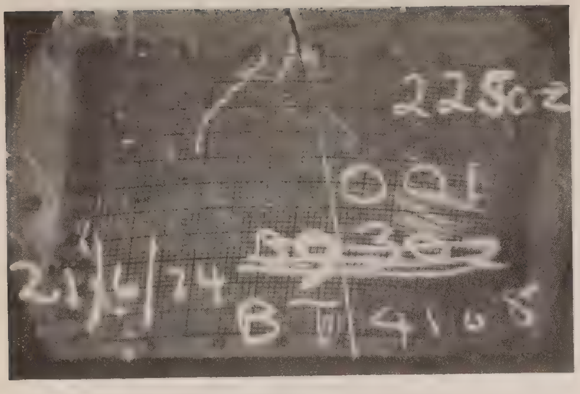
Although B.T.'s at station P were taken every 3 hours, only the one taken at 1800 GMT has been shown.

Weather conditions on Line P sometimes forces the cancellation of a B.T., in that case an X.B.T. was taken. These X.B.T.'s are shown following the B.T.'s.

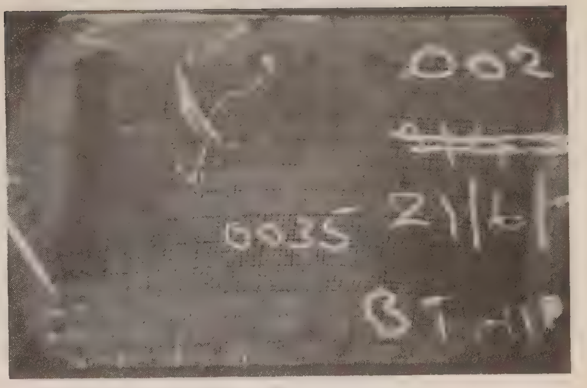
EXPLANATION OF HEADINGS

Example: 0030/ 13-04-74
48° 34' N.
125° 30' W.

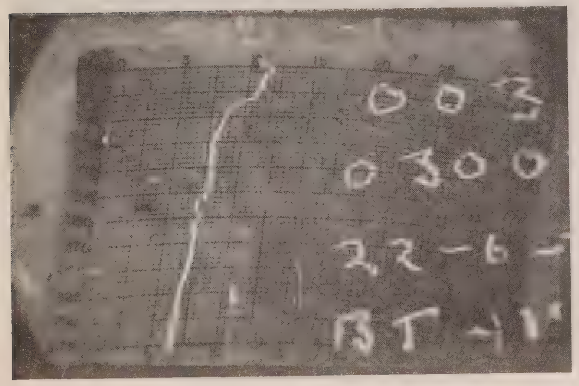
0030 = Time in GMT
13 = Day
04 = Month
74 = Year
48° 34' N. = Latitude
125° 30' W. = Longitude



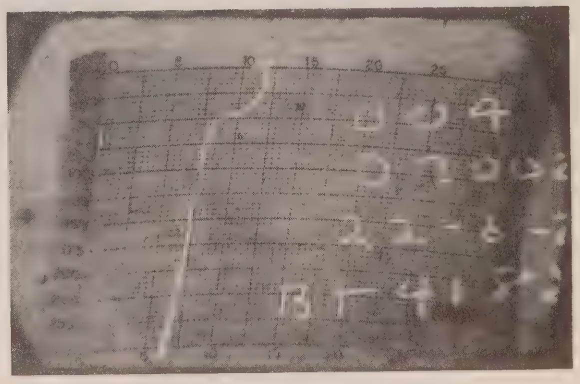
2250 / 21-06-74
48° 33' N.
125° 23' W.



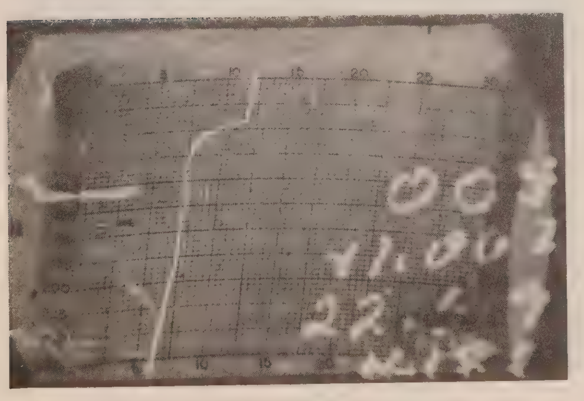
0035 / 22-06-74
48° 36' N.
126° 00' W.



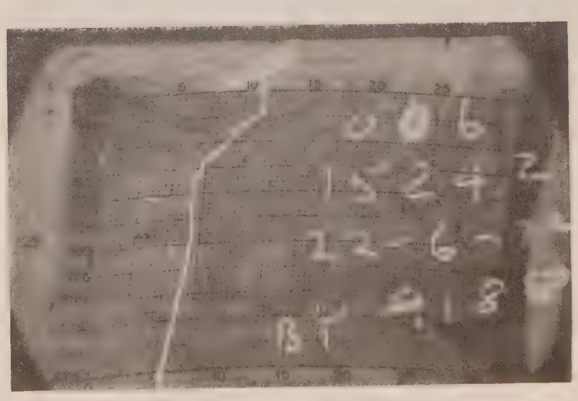
0300 / 22-06-74
48° 39' N.
126° 40' W.



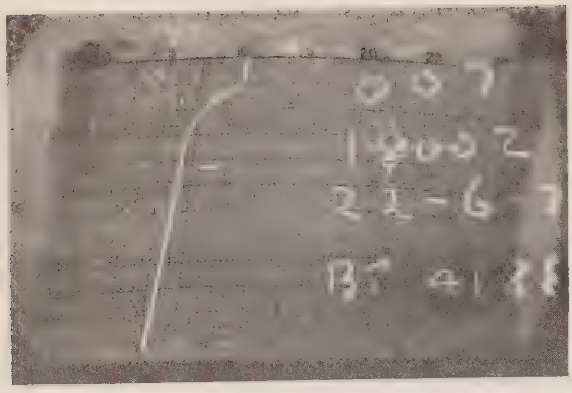
0700 / 22-06-74
48° 43' N.
127° 40' W.



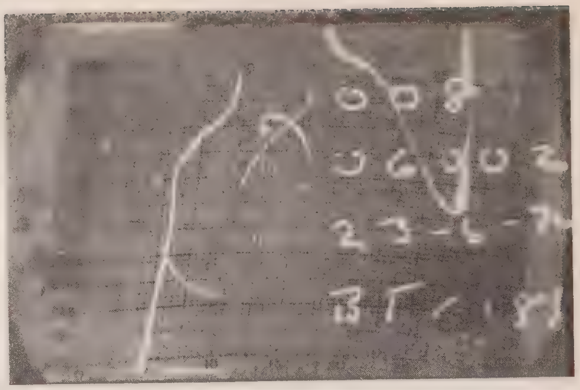
1100 / 22-06-74
48° 49' N.
128° 40' W.



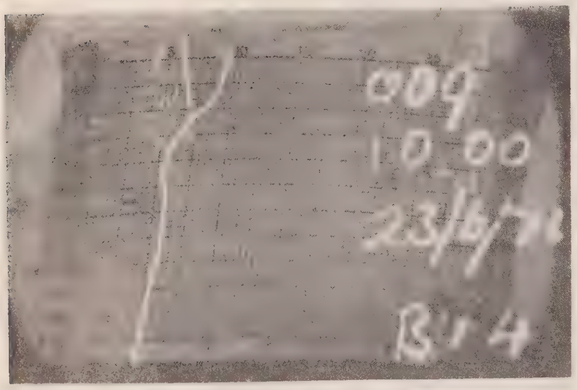
1524 / 22-06-74
48° 50' N.
129° 47° W.



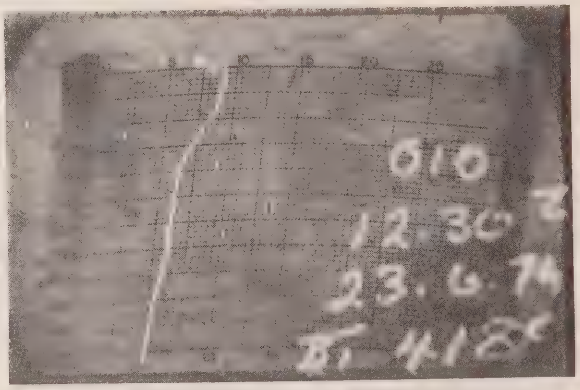
1800 / 22-06-74
48° 57' N.
130° 40' W.



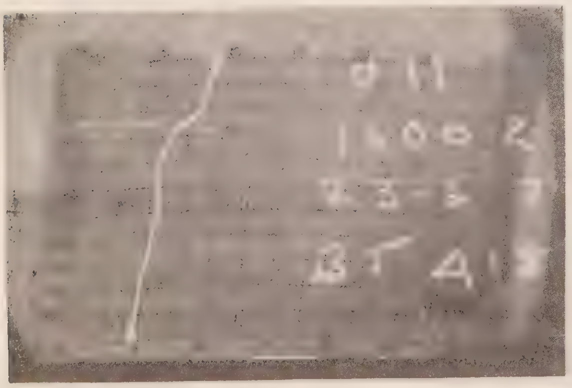
0600 / 23-06-74
49° 24' N.
133° 40' W.



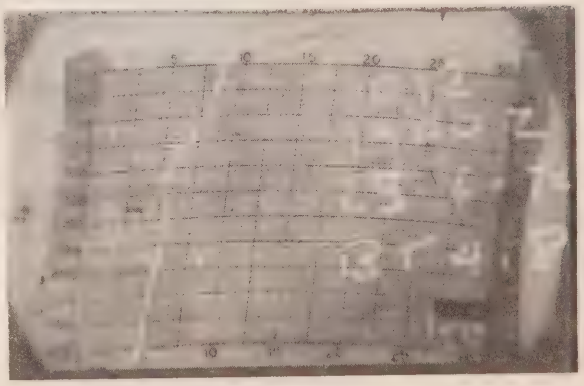
1000 / 23-06-74
49° 14' N.
134° 40' W.



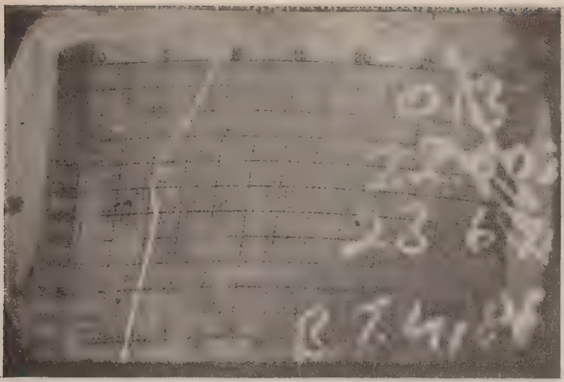
1230 / 23-06-74
49° 18' N.
135° 40' W.



1600 / 23-06-74
49° 23' N.
136° 42' W.

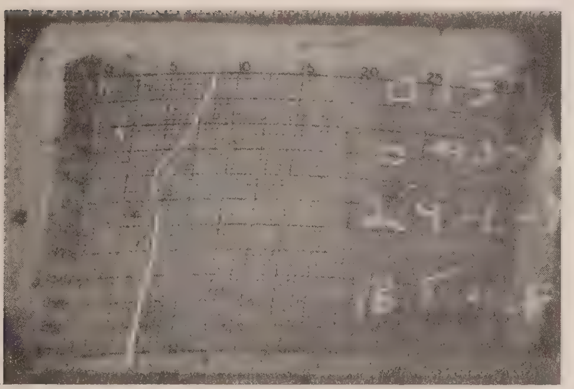


1900 / 23-06-74
49° 27' N.
137° 40' W.

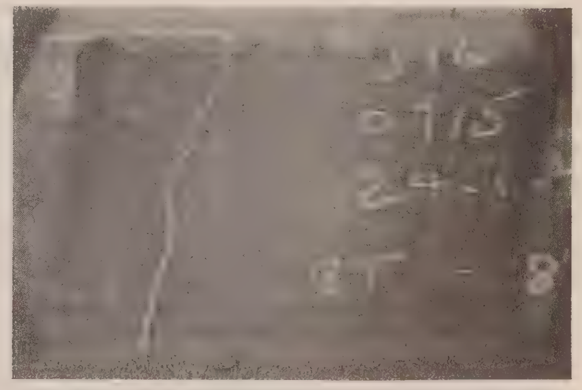


2200 / 23-06-74
49° 31' N.
138° 36' W.

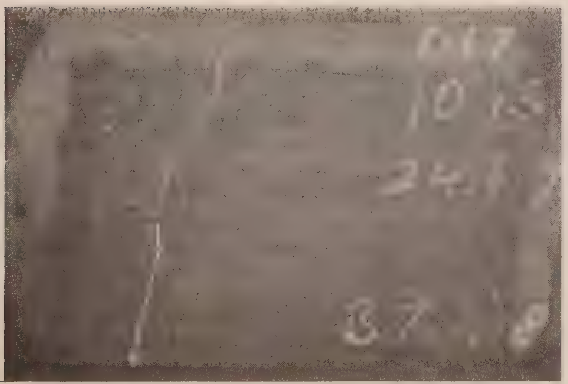
0100 / 24-06-74
49° 36' N.
139° 40' W.



0400 / 24-06-74
49° 40' N.
140° 40' W.



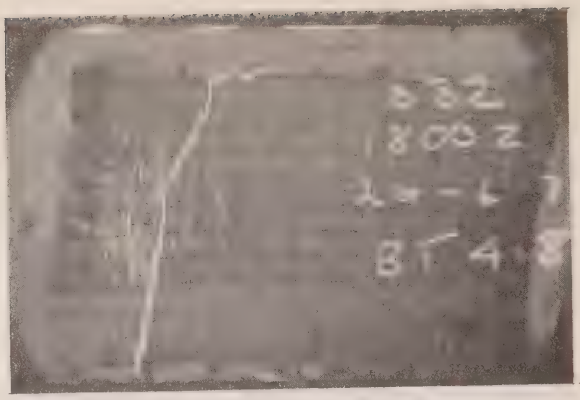
0715 / 24-06-74
49° 45' N.
141° 40' W.



1015 / 24-06-74
49° 50' N.
142° 40' W.

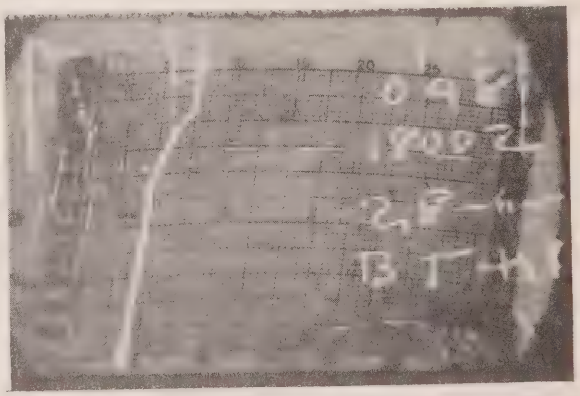
1500 / 24-06-74
50° 00' N.
143° 40' W.

1800 / 25-06-74
49° 44' N.
145° 17' W.

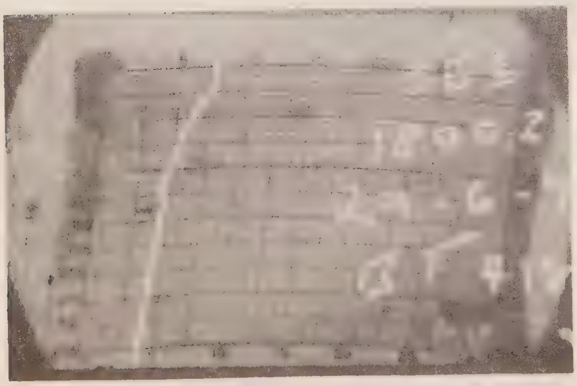


1800 / 26-06-74
50° 15' N.
147° 30' W.

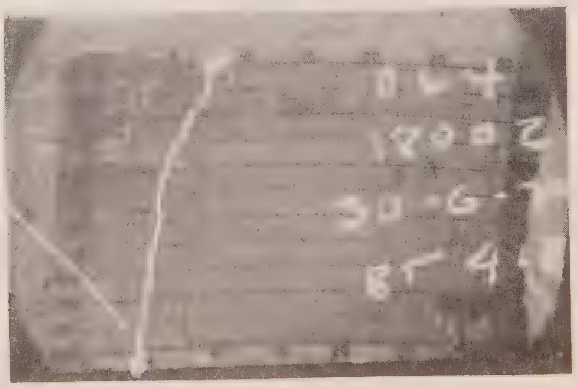
1800 / 27-06-74
50° 09' N.
146° 40' W.



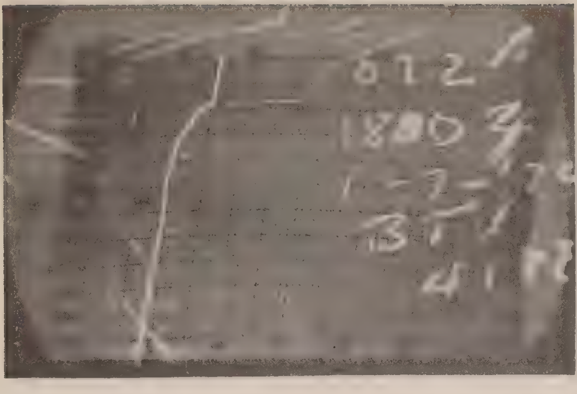
1800 / 28-06-74
50° 10' N.
146° 00' W.



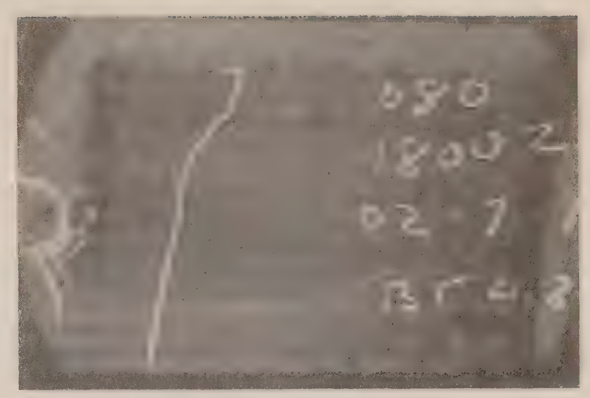
1800 / 29-06-74
50° 04' N.
146° 45' W.



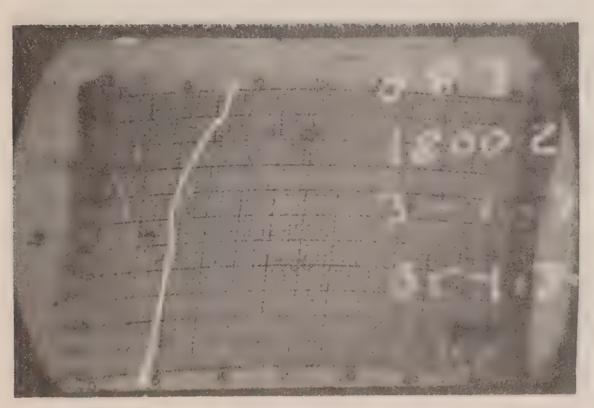
1800 / 30-06-74
50° 16' N.
145° 14' W.



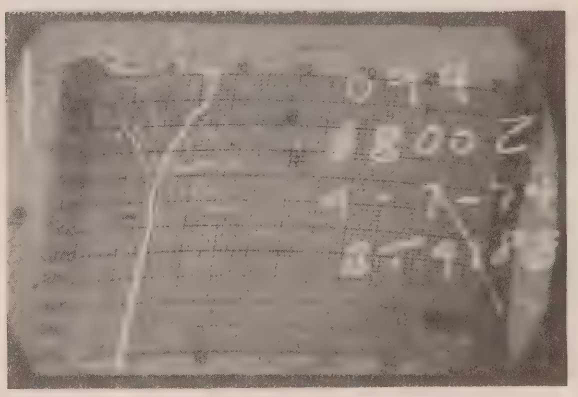
1800 / 01-07-74
50° 21' N.
145° 26' W.



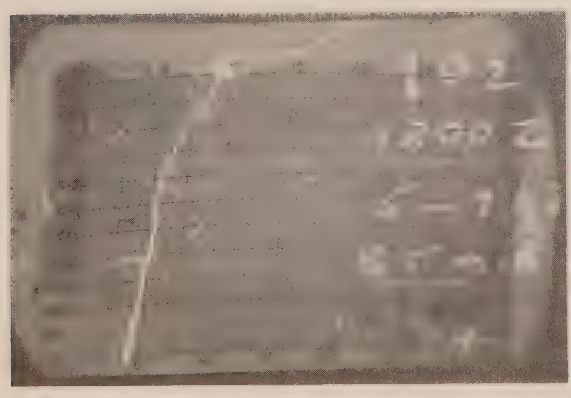
1800 / 02-07-74
50° 16' N.
145° 22' W.



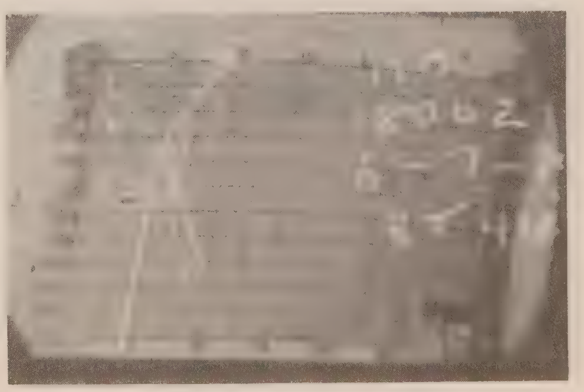
1800 / 03-07-74
49° 52' N.
144° 52' W.



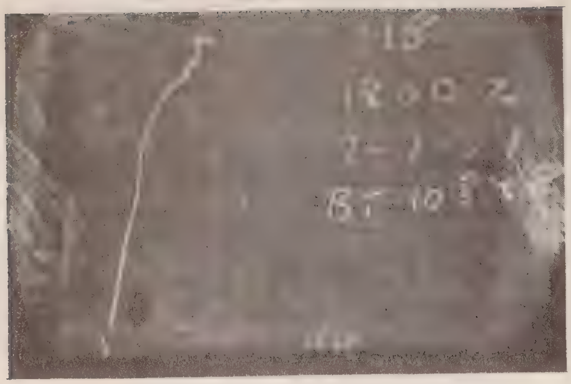
1800 / 04-07-74
49° 57' N.
144° 56' W.



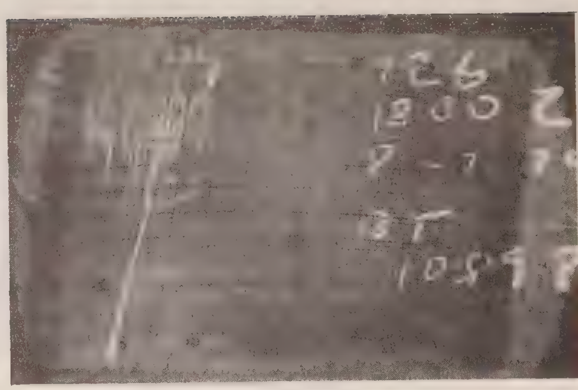
1800 / 05-07-74
49° 58' N.
144° 54' W.



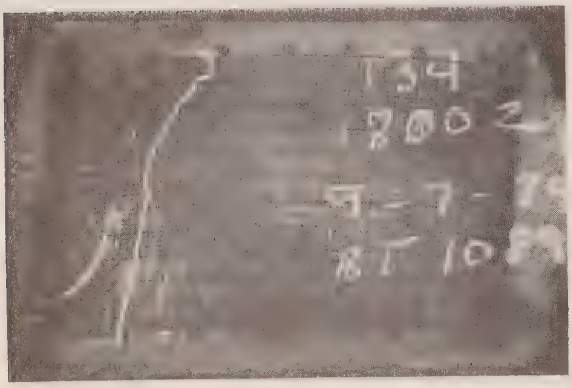
1800 / 06-07-74
50° 07' N.
145° 00' W.



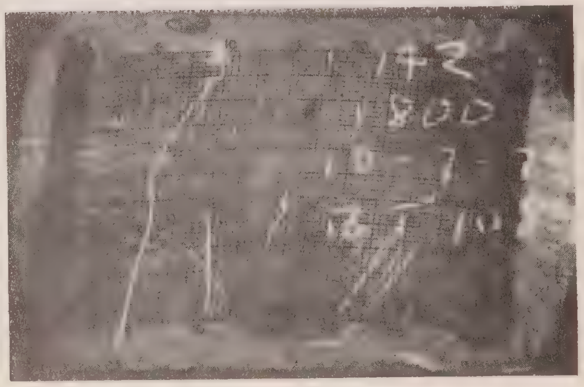
1800 / 07-07-74
50° 20' N.
145° 17' W.



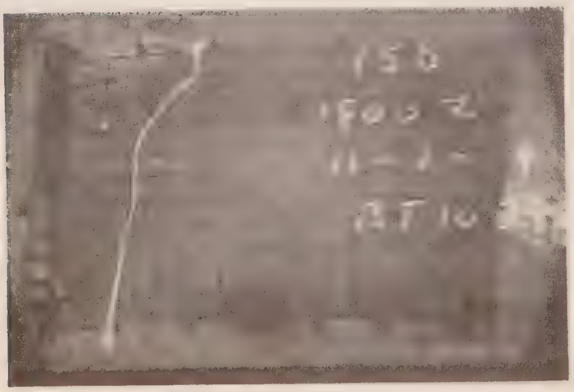
1800 / 08-07-74
49° 52' N.
144° 47' W.



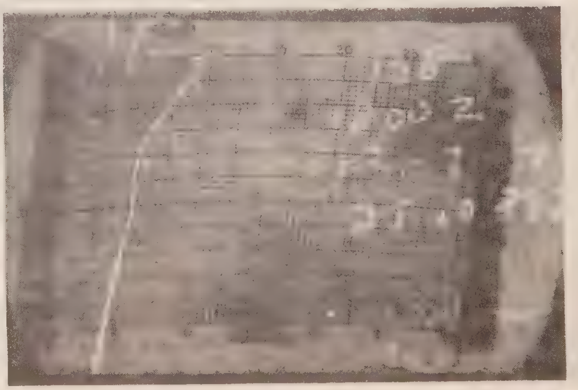
1800 / 09-07-74
49° 50' N.
144° 23' W.



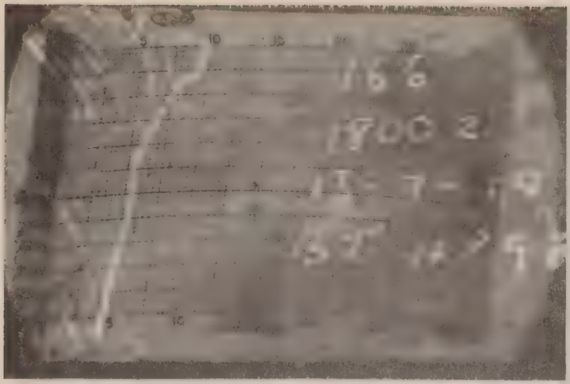
1800 / 10-07-74
49° 44' N.
144° 00' W.



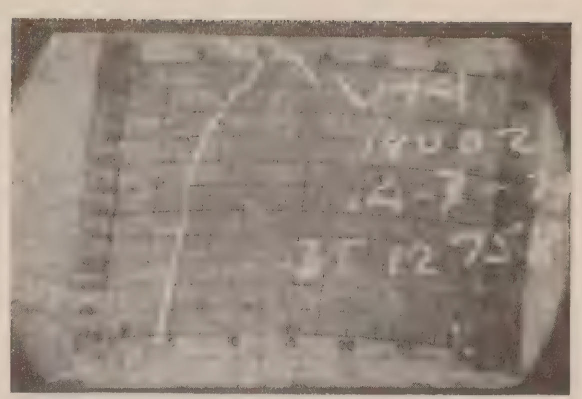
1800 / 11-07-74
50° 00' N.
145° 45' W.



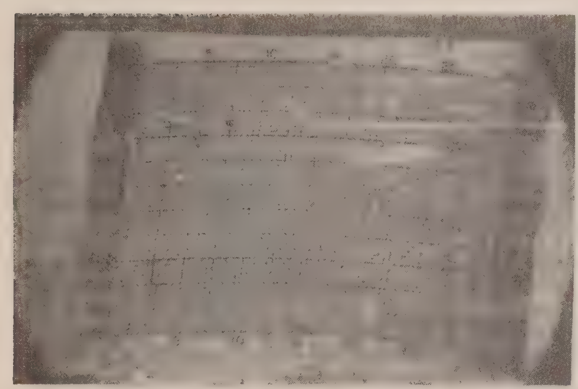
1800 / 12-07-74
49° 57' N.
145° 28' W.



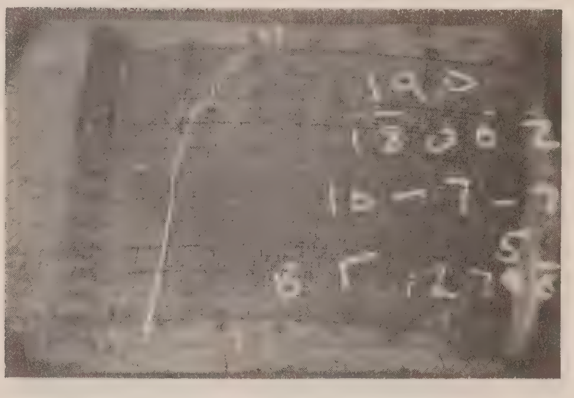
1800 / 13-07-74
49° 59' N.
145° 16' W.



1800 / 14-07-74
49° 55' N.
145° 05' W.

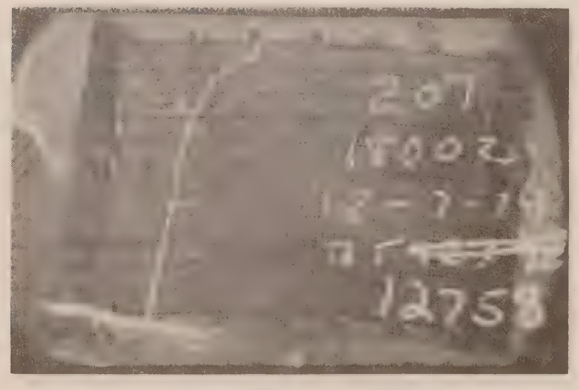


1800 / 15-07-74
49° 59' N.
145° 04' W.

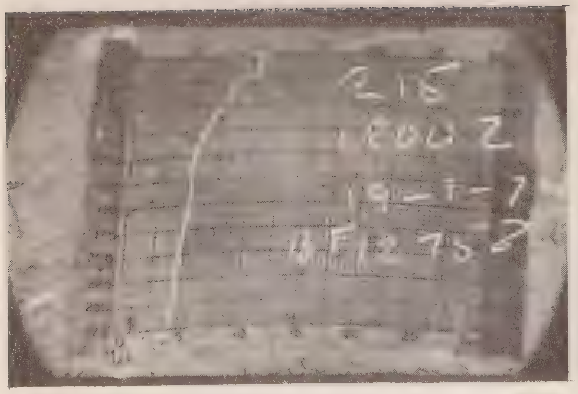


1800 / 16-07-74
50° 12' N.
145° 14' W.

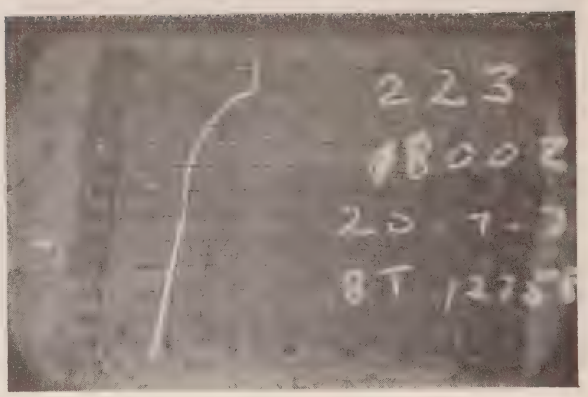
1800 / 17-07-74
50° 02' N.
145° 24' W.



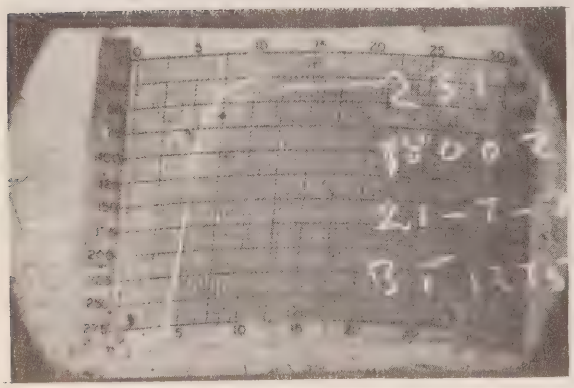
1800 / 18-07-74
49° 48' N.
145° 12' W.



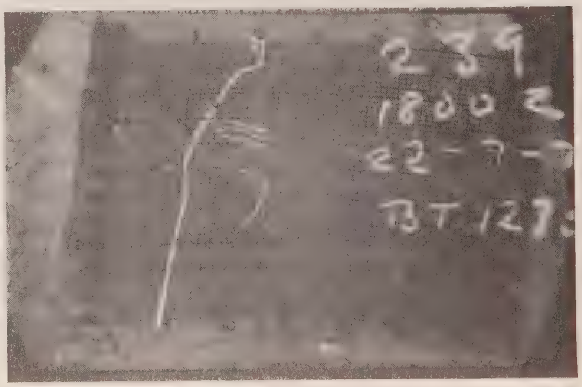
1800 / 19-07-74
50° 00' N.
144° 53' W.



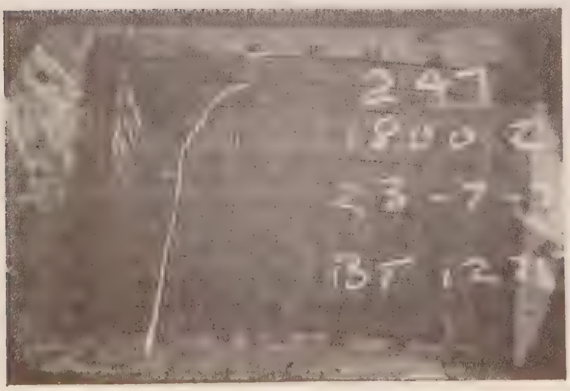
1800 / 20-07-74
59° 53' N.
145° 30' W.



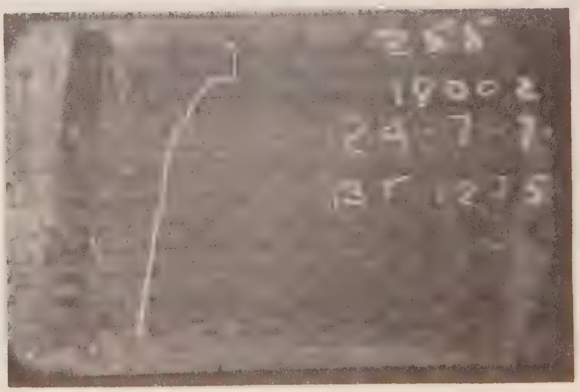
1800 / 21-07-74
49° 58' N.
145° 16' W.



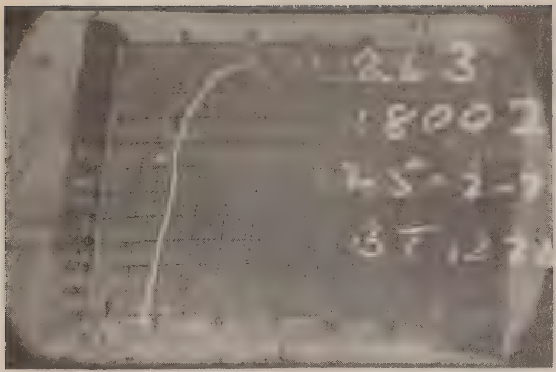
1800 / 22-07-74
50° 00' N.
144° 49' W.



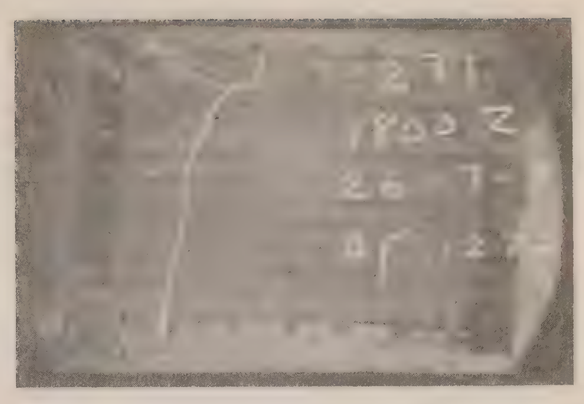
1800 / 23-07-74
49° 53' N.
145° 45' W.



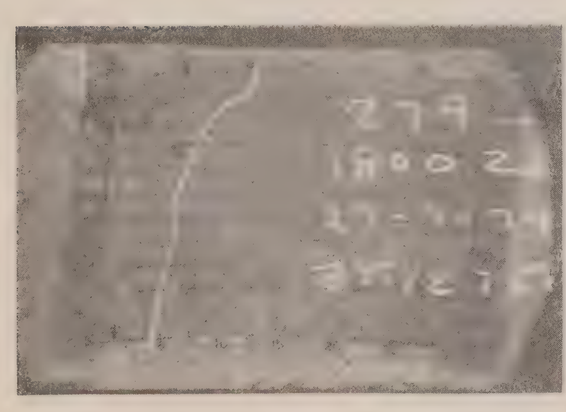
1800 / 24-07-74
49° 57' N.
145° 12' W.



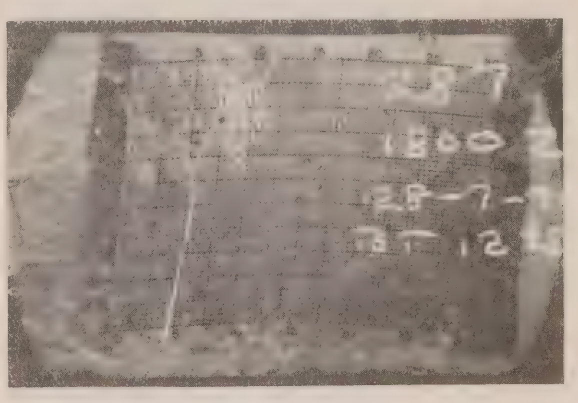
1800 / 25-07-74
50° 01' N.
144° 55' W.



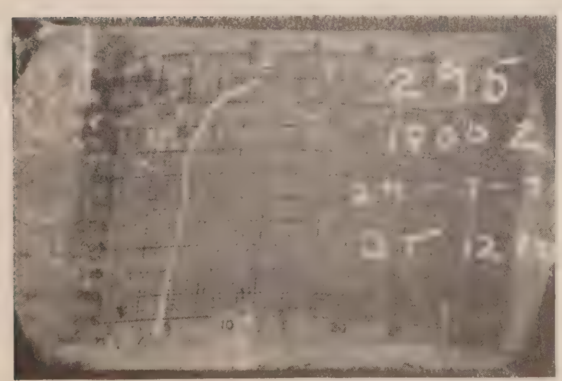
1800 / 26-07-74
50° 02' N.
144° 38' W.



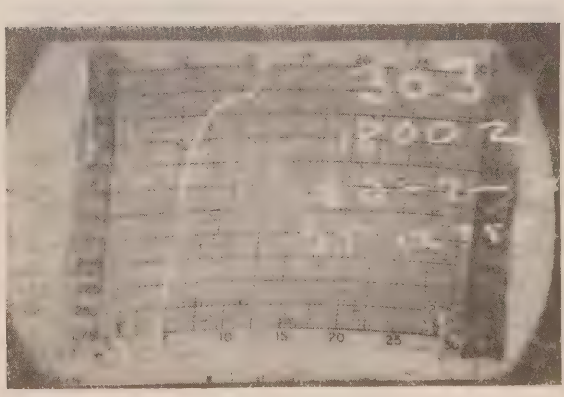
1800 / 27-07-74
50° 00' N.
144° 33' W.



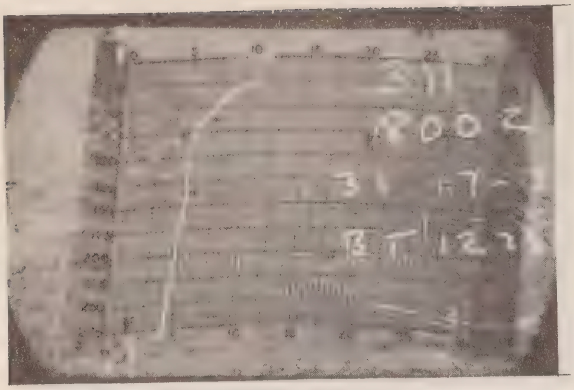
1800 / 28-07-74
49° 55' N.
144° 31' W.



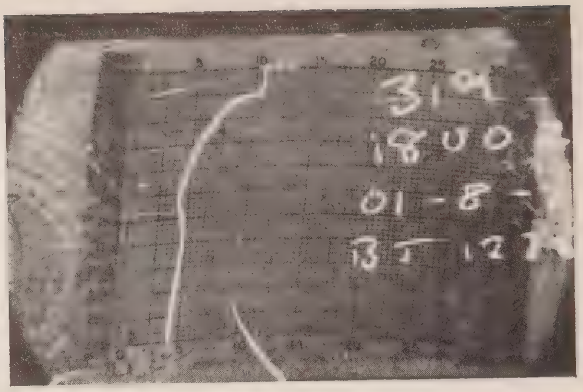
1800 / 29-07-74
49° 52' N.
144° 42' W.



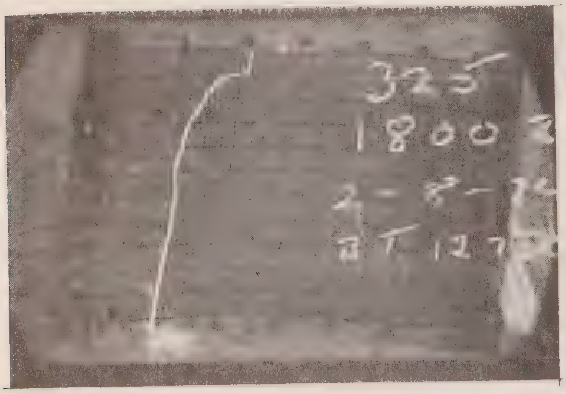
1800 / 30-07-74
49° 57' N.
145° 21' W.



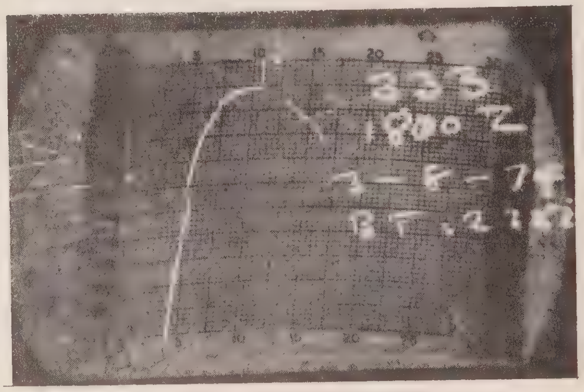
1800 / 31-07-74
50° 07' N.
145° 53' W.



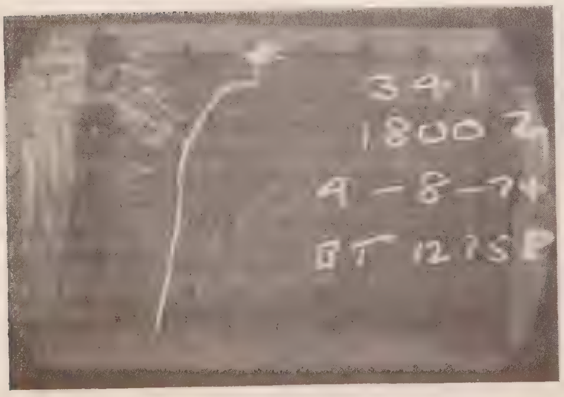
1800 / 01-08-74
50° 24' N.
145° 58' W.



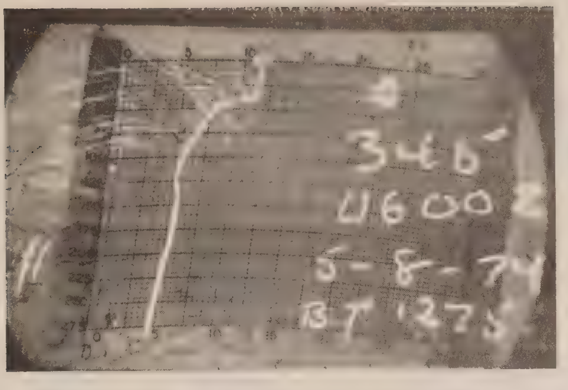
1800 / 02-08-74
50° 13' N.
145° 58' W.



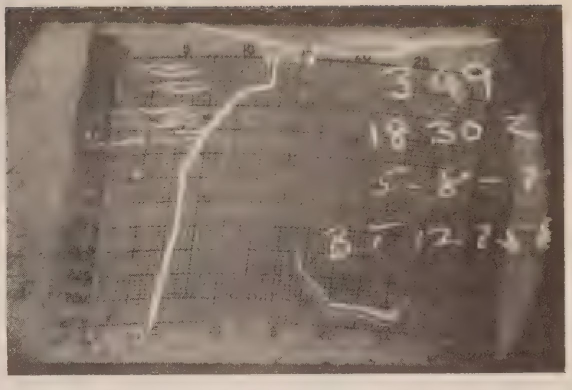
1800 / 03-08-74
50° 18' N.
145° 27' W.



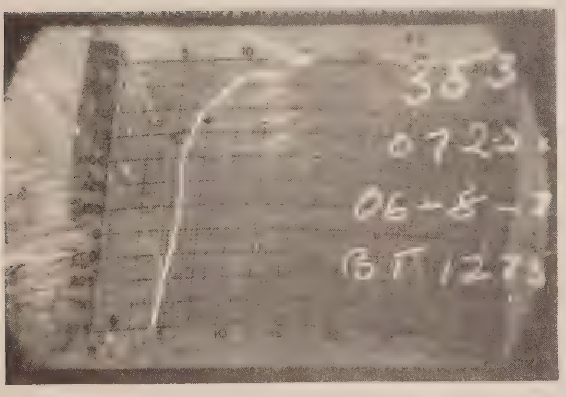
1800 / 04-08-74
50° 15' N.
144° 51' W.



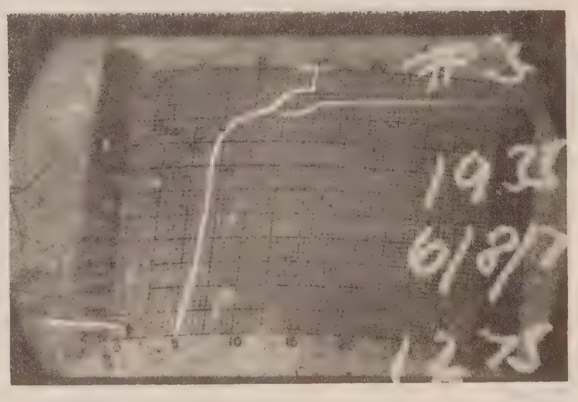
0600 / 05-08-74
49° 50' N.
142° 40' W.



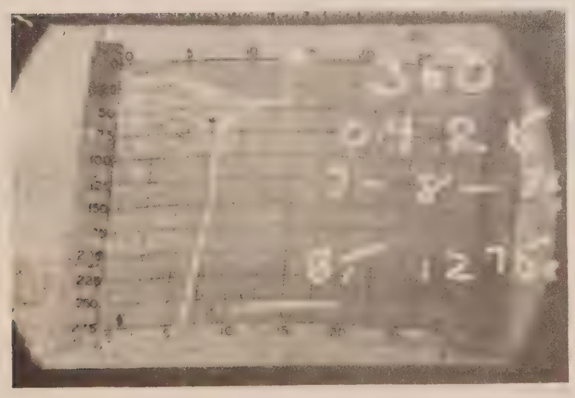
1830 / 05-08-74
49° 31' N.
138° 40' W.



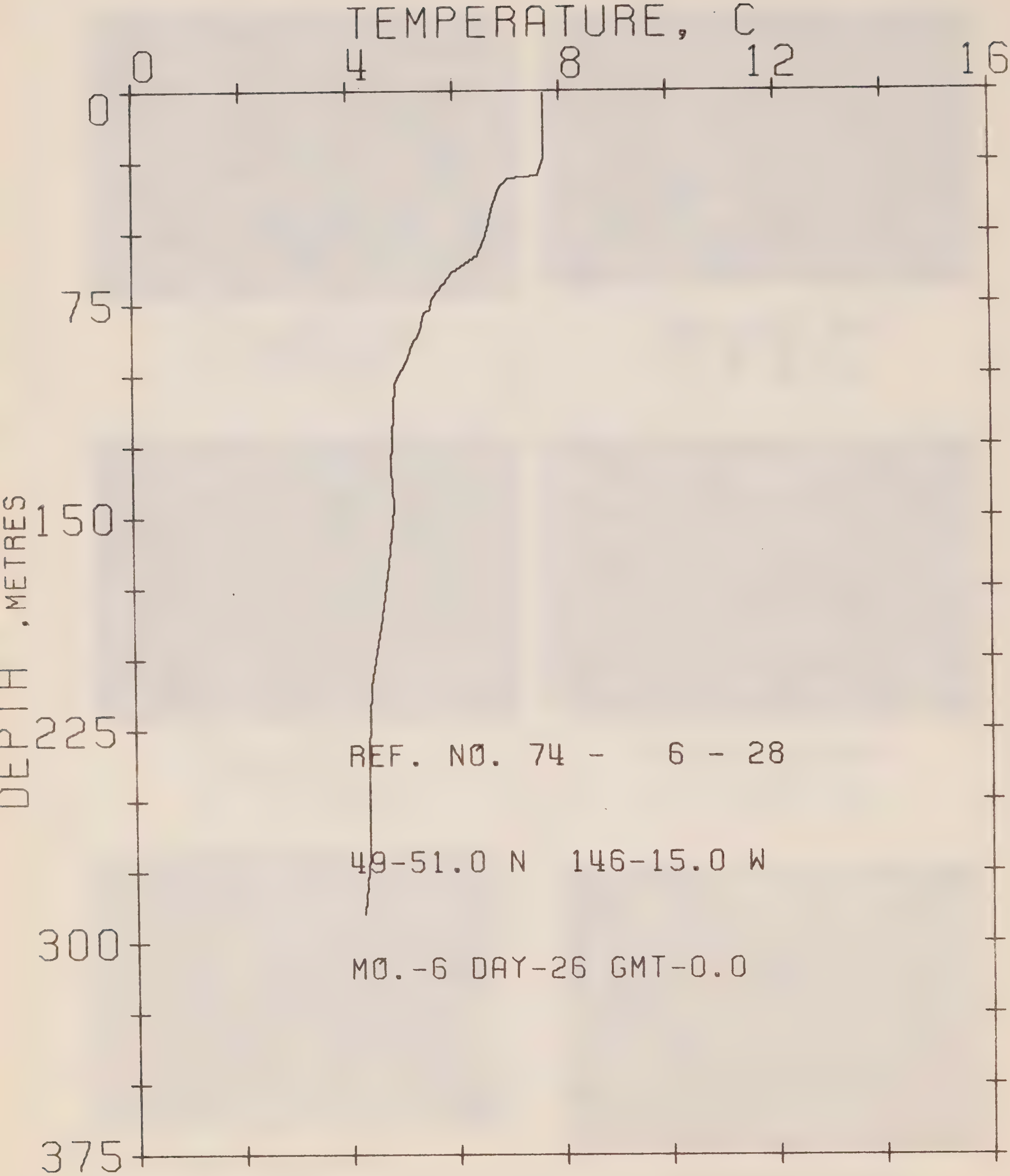
0720 / 06-08-74
49° 14' N.
134° 40' W.



1935 / 06-08-74
48° 57' N.
130° 40' W.

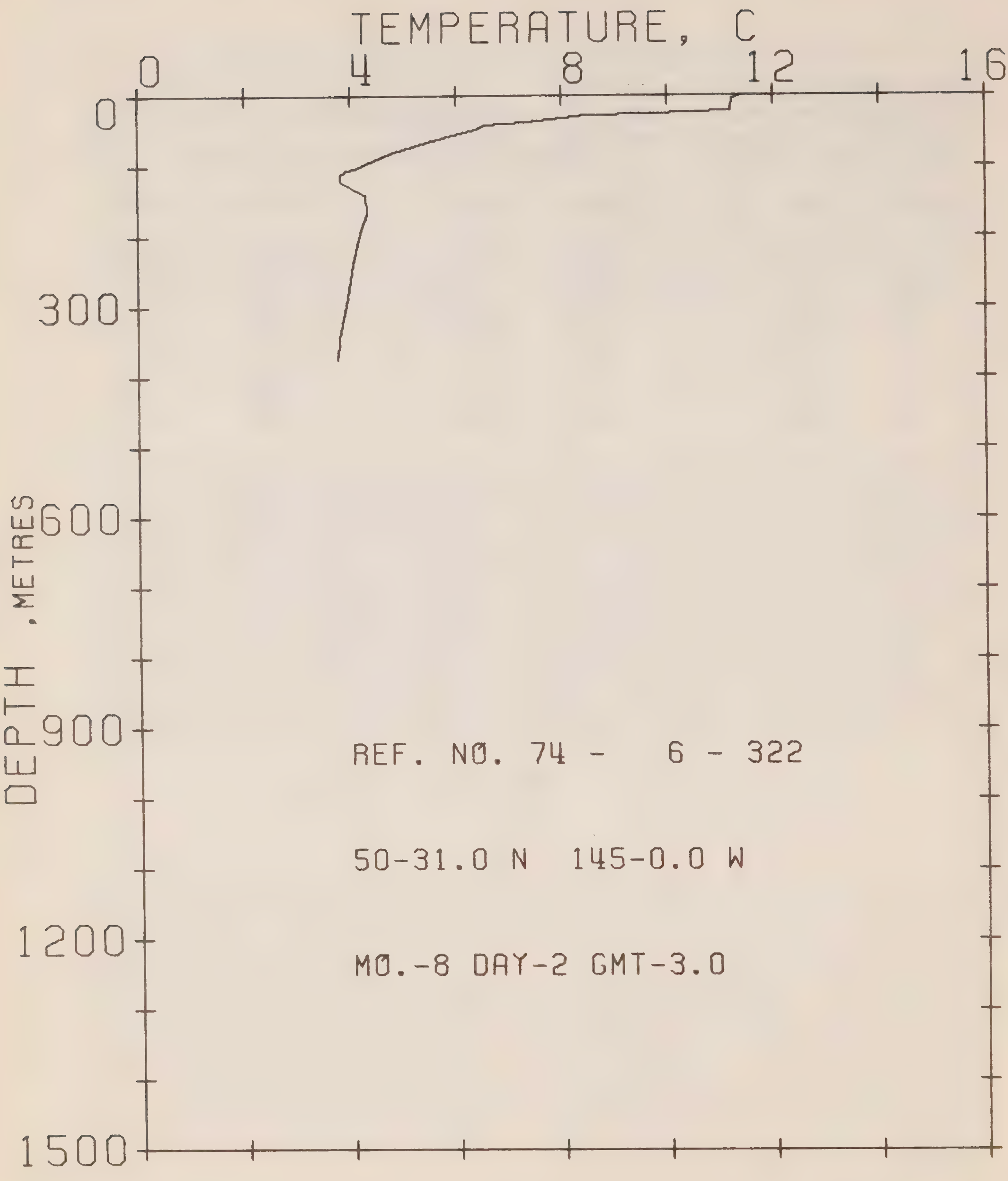


0425 / 07-08-74
48° 44' N.
127° 40' W.


TEMPERATURE, C
0
4
8
12
16
0
75
150
225
300
375
DEPTH ,METRES
REF. NO. 74 - 6 - 28
49-51.0 N 146-15.0 W
MO.-6 DAY-26 GMT-0.0

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6- 28 DATE 26- 6-74
POSITION 49-51.0N 146-15.0W GMT 0.0
RESULTS OF XBT CAST 24 POINTS TAKEN FROM ANALOG TRACE

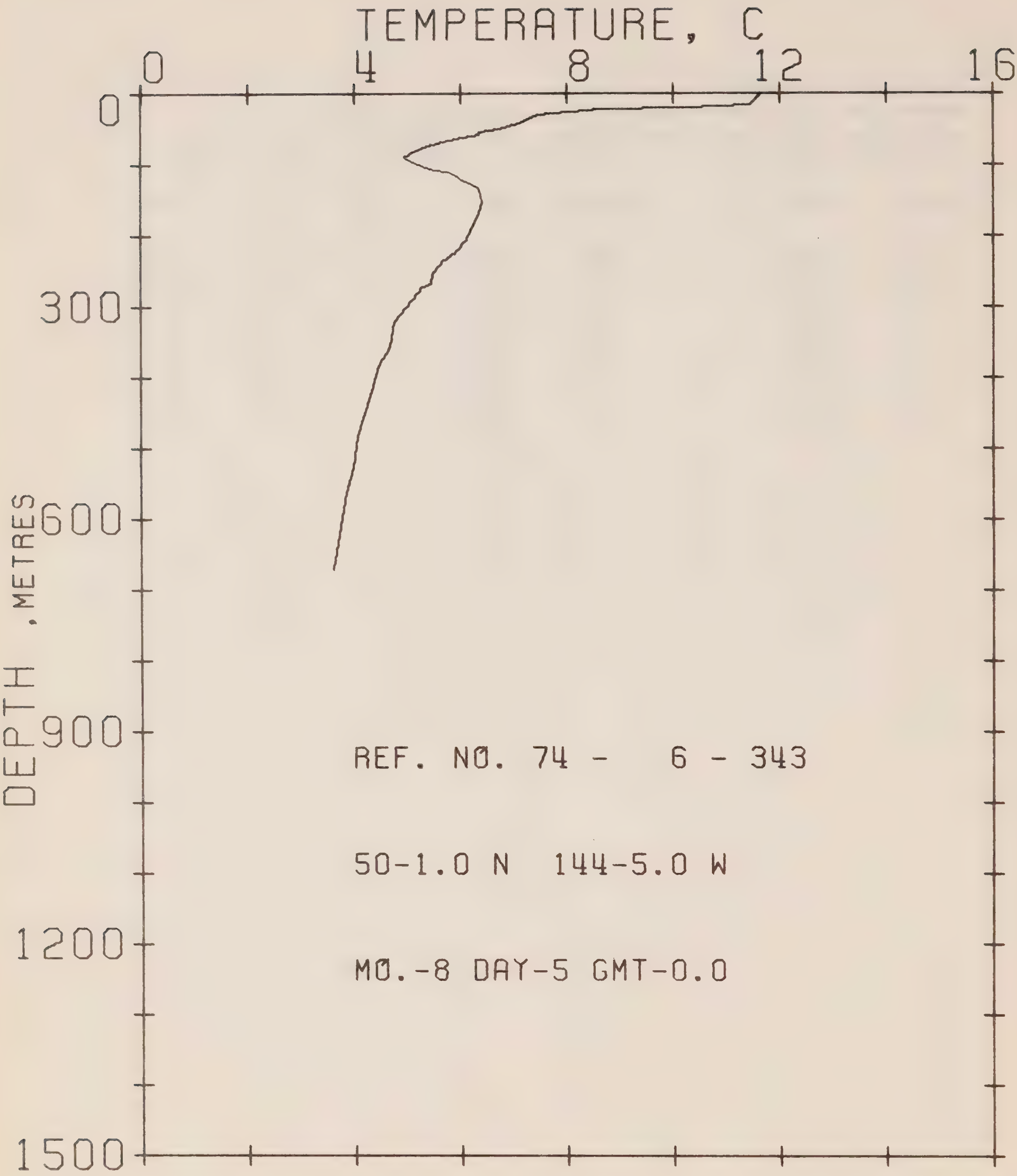
DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
1	7.50	64	5.75	133	4.56
24	7.49	73	5.36	147	4.61
30	7.38	77	5.31	167	4.49
31	6.84	78	5.20	189	4.32
34	6.68	85	5.14	210	4.14
42	6.52	90	4.97	234	4.07
51	6.40	94	4.91	270	4.05
58	6.24	103	4.63	290	3.93



TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NØ. 74 - 6 - 322
50-31.0 N 145-0.0 W
MØ.-8 DAY-2 GMT-3.0

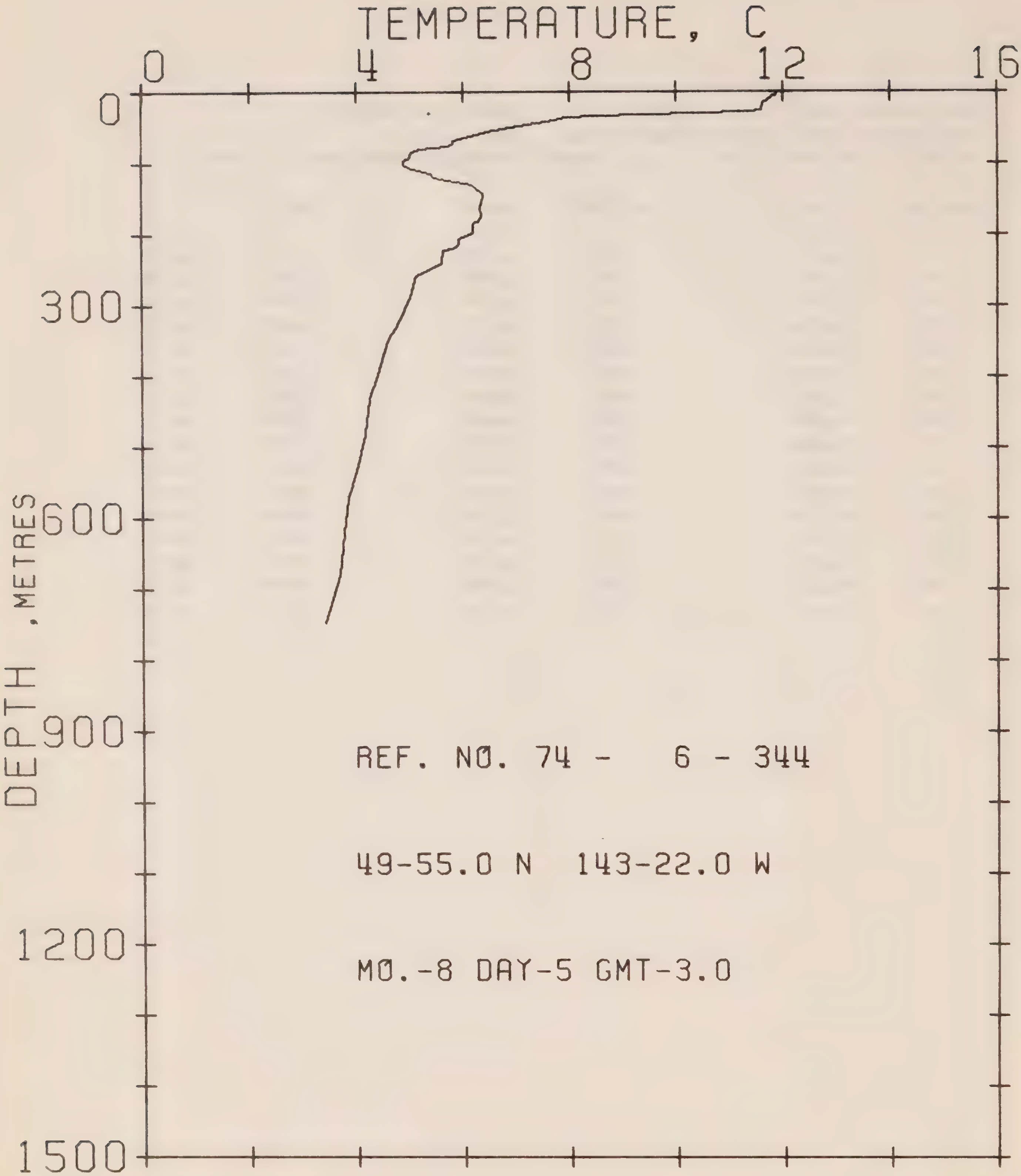
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6-322 DATE 2- 8-74
POSITION 50-31.0N 145- 0.0W GMT 3.0
RESULTS OF XBT CAST 24 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
2	11.37	56	5.93	131	3.96
4	11.22	66	5.45	143	4.25
23	11.18	81	4.81	169	4.27
25	9.68	98	4.21	196	4.13
29	8.48	105	4.05	240	4.00
38	7.32	107	3.89	289	3.88
43	6.52	113	3.78	346	3.70
48	6.36	122	3.79	377	3.67


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NØ. 74 - 6 - 343
50-1.0 N 144-5.0 W
MØ.-8 DAY-5 GMT-0.0

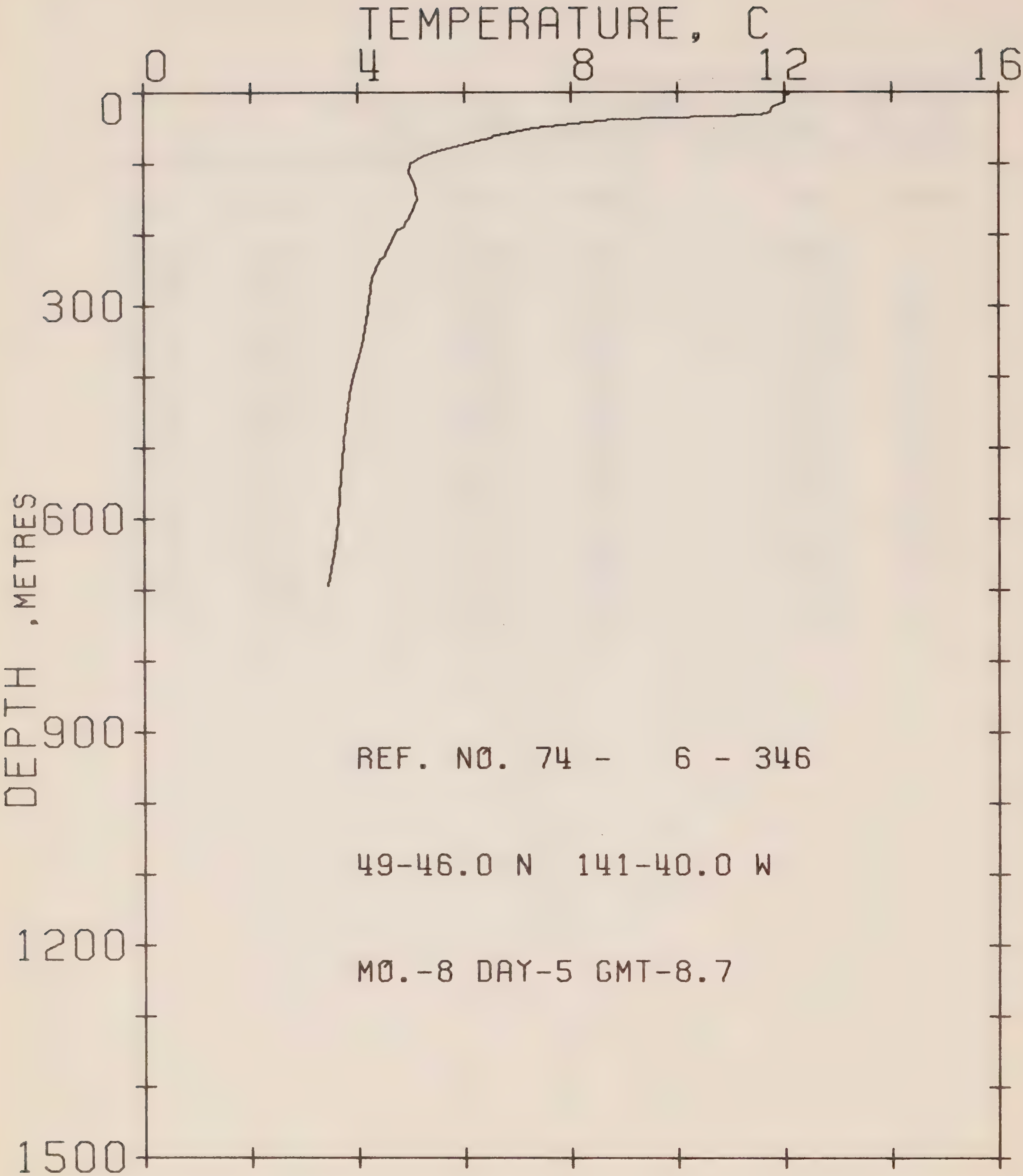
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6-343 DATE 5- 8-74
POSITION 50- 1.0N 144- 5.0W GMT 0.0
RESULTS OF XBT CAST 48 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
2	11.53	91	4.83	233	5.60
7	11.48	99	5.00	235	5.55
16	11.33	102	5.17	254	5.34
20	10.14	105	5.22	269	5.29
22	8.52	106	5.33	272	5.13
25	7.99	109	5.39	293	4.92
28	7.56	111	5.66	323	4.60
33	7.25	118	5.83	358	4.51
42	6.98	122	5.88	385	4.30
50	6.61	125	6.05	421	4.15
55	6.23	133	6.21	484	3.90
59	6.24	152	6.27	528	3.80
62	5.91	170	6.23	565	3.65
68	5.54	193	6.07	611	3.56
75	5.21	206	5.97	672	3.42
84	4.94	224	5.76	751	3.29


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NO. 74 - 6 - 344
49-55.0 N 143-22.0 W
MO.-8 DAY-5 GMT-3.0

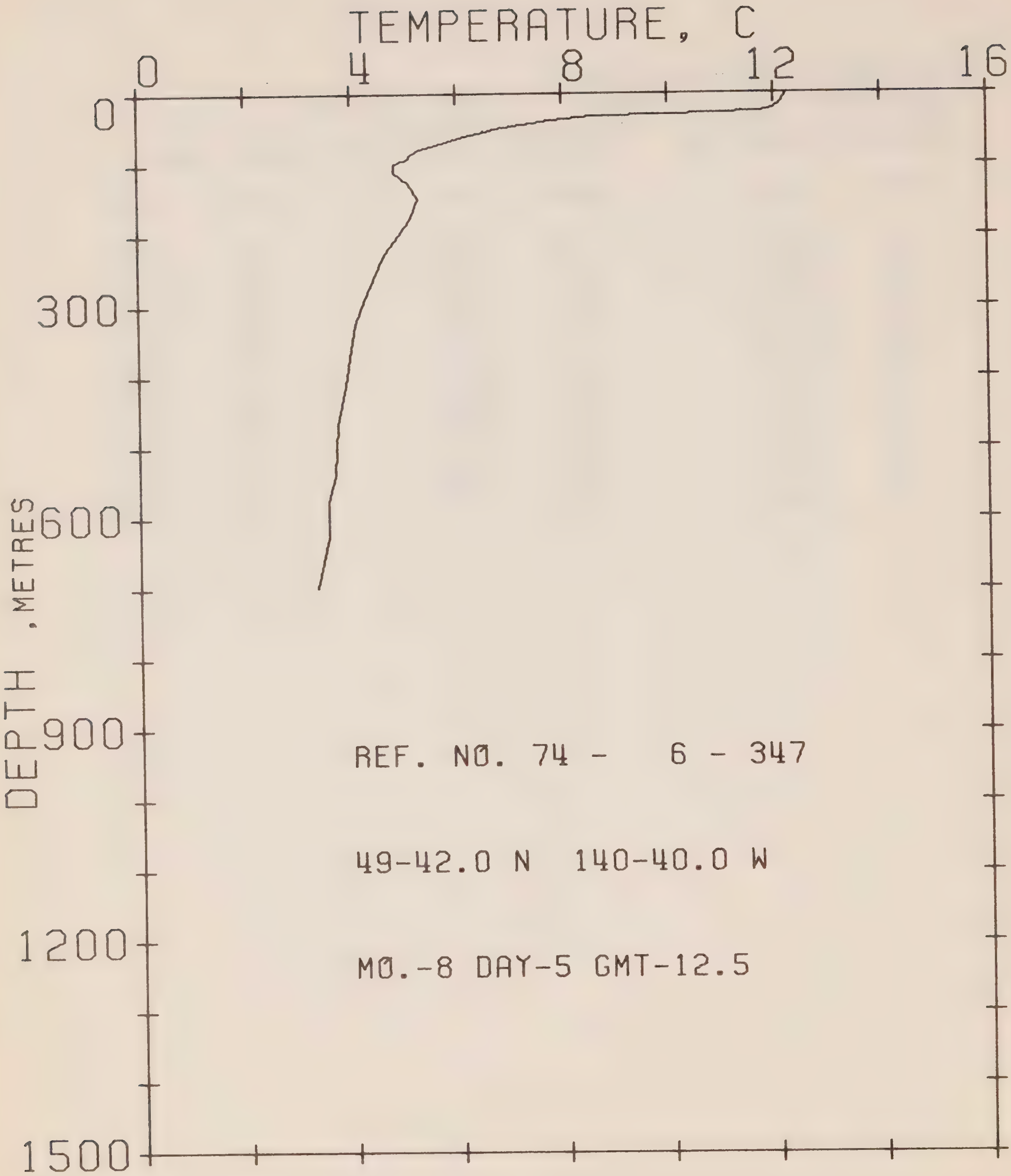
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6-344 DATE 5- 8-74
POSITION 49-55.0N 143-22.0W GMT 3.0
RESULTS OF XBT CAST 50 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
2	11.89	97	4.87	220	5.76
8	11.79	103	4.87	222	5.60
16	11.63	108	5.03	241	5.55
25	11.58	114	5.36	251	5.28
29	11.33	120	5.42	259	5.06
34	8.46	124	5.69	289	4.95
37	7.93	131	6.13	324	4.74
43	7.56	134	6.18	350	4.52
46	7.19	140	6.29	398	4.31
50	6.87	142	6.34	432	4.15
57	6.44	149	6.35	483	4.05
69	5.79	163	6.29	535	3.89
72	5.79	177	6.30	573	3.73
75	5.68	187	6.14	622	3.63
80	5.19	198	6.14	680	3.53
84	5.03	206	5.87	749	3.26
92	4.98	215	5.87		


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NØ. 74 - 6 - 346
49-46.0 N 141-40.0 W
MØ.-8 DAY-5 GMT-8.7

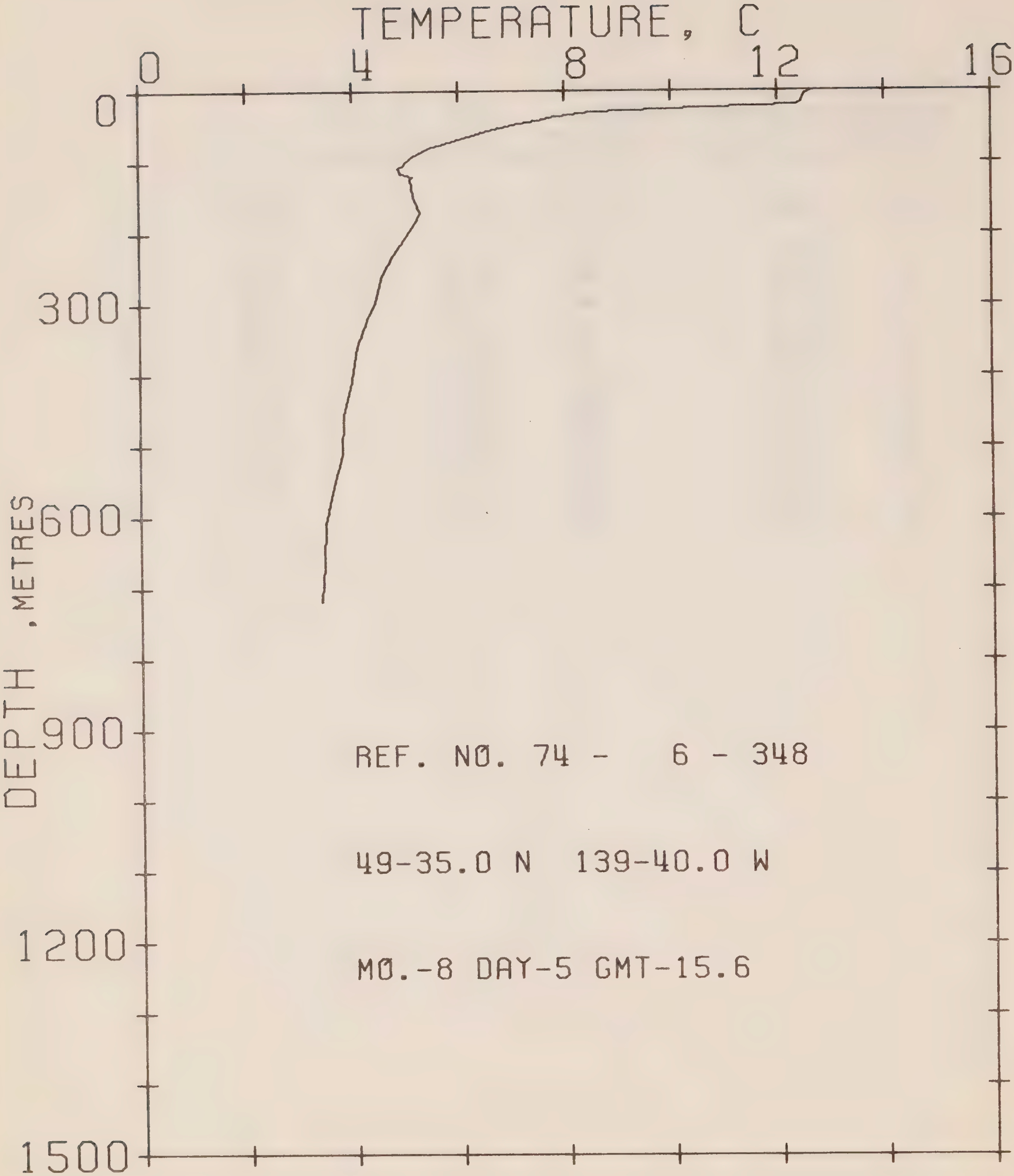
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6-346 DATE 5- 8-74
POSITION 49-46.0N 141-40.0W GMT 8.7
RESULTS OF XBT CAST 36 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
2	12.09	65	6.49	210	4.61
7	11.99	69	6.22	232	4.45
15	11.99	74	5.90	234	4.39
20	11.79	81	5.58	262	4.23
29	11.74	91	5.20	323	4.13
33	11.53	100	4.98	357	4.03
37	9.82	115	4.93	414	3.82
39	8.78	128	5.04	472	3.71
44	8.04	151	5.10	543	3.62
51	7.30	170	4.99	627	3.52
59	6.76	190	4.83	694	3.36
61	6.55	193	4.72	751	3.26


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NO. 74 - 6 - 347
49-42.0 N 140-40.0 W
MO.-8 DAY-5 GMT-12.5

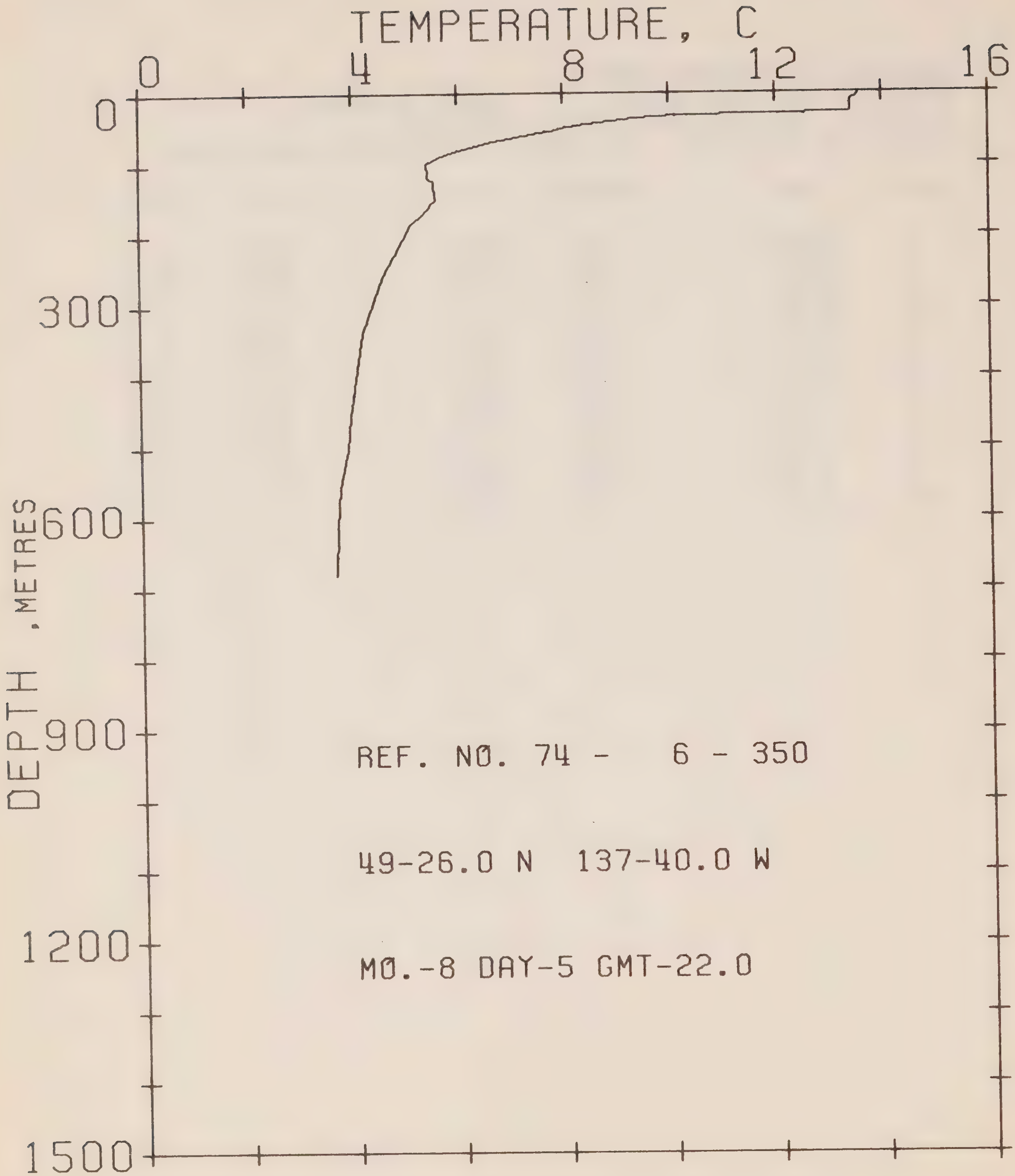
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6-347 DATE 5- 8-74
POSITION 49-42.0N 140-40.0W GMT 12.5
RESULTS OF XBT CAST 35 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
2	12.25	73	5.62	263	4.38
14	12.14	79	5.30	294	4.21
23	11.99	86	5.13	325	4.05
27	11.73	92	5.08	360	3.94
31	9.98	96	4.91	413	3.84
33	8.62	101	4.81	469	3.67
38	7.77	111	4.81	541	3.62
45	7.24	126	5.08	575	3.46
50	6.70	149	5.25	625	3.46
54	6.54	174	5.14	699	3.25
60	6.16	201	4.87	751	3.20
66	5.89	226	4.60		


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NØ. 74 - 6 - 348
49-35.0 N 139-40.0 W
MØ.-8 DAY-5 GMT-15.6

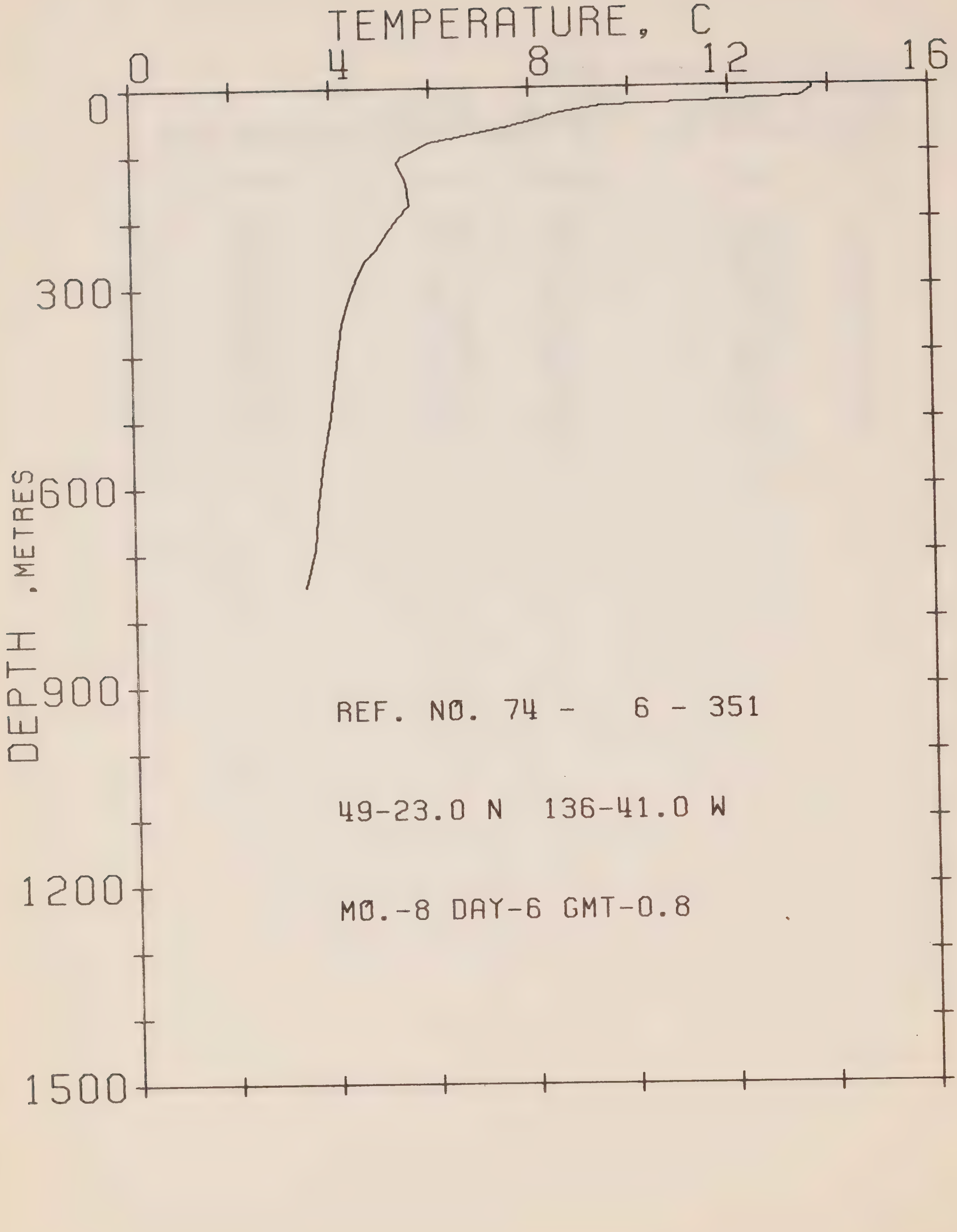
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6-348 DATE 5- 8-74
POSITION 49-35.0N 139-40.0W GMT 15.6
RESULTS OF XBT CAST 35 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
1	12.55	92	5.01	298	4.31
7	12.40	104	4.86	323	4.16
17	12.36	109	4.75	361	3.96
21	12.26	116	4.81	418	3.83
27	9.73	120	5.03	459	3.68
31	8.42	123	4.98	513	3.66
38	7.57	149	5.05	564	3.47
40	7.52	172	5.17	611	3.33
46	7.05	186	5.07	666	3.31
57	6.46	210	4.86	718	3.23
70	5.82	230	4.66	751	3.14
80	5.34	259	4.45		


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NO. 74 - 6 - 350
49-26.0 N 137-40.0 W
MO.-8 DAY-5 GMT-22.0

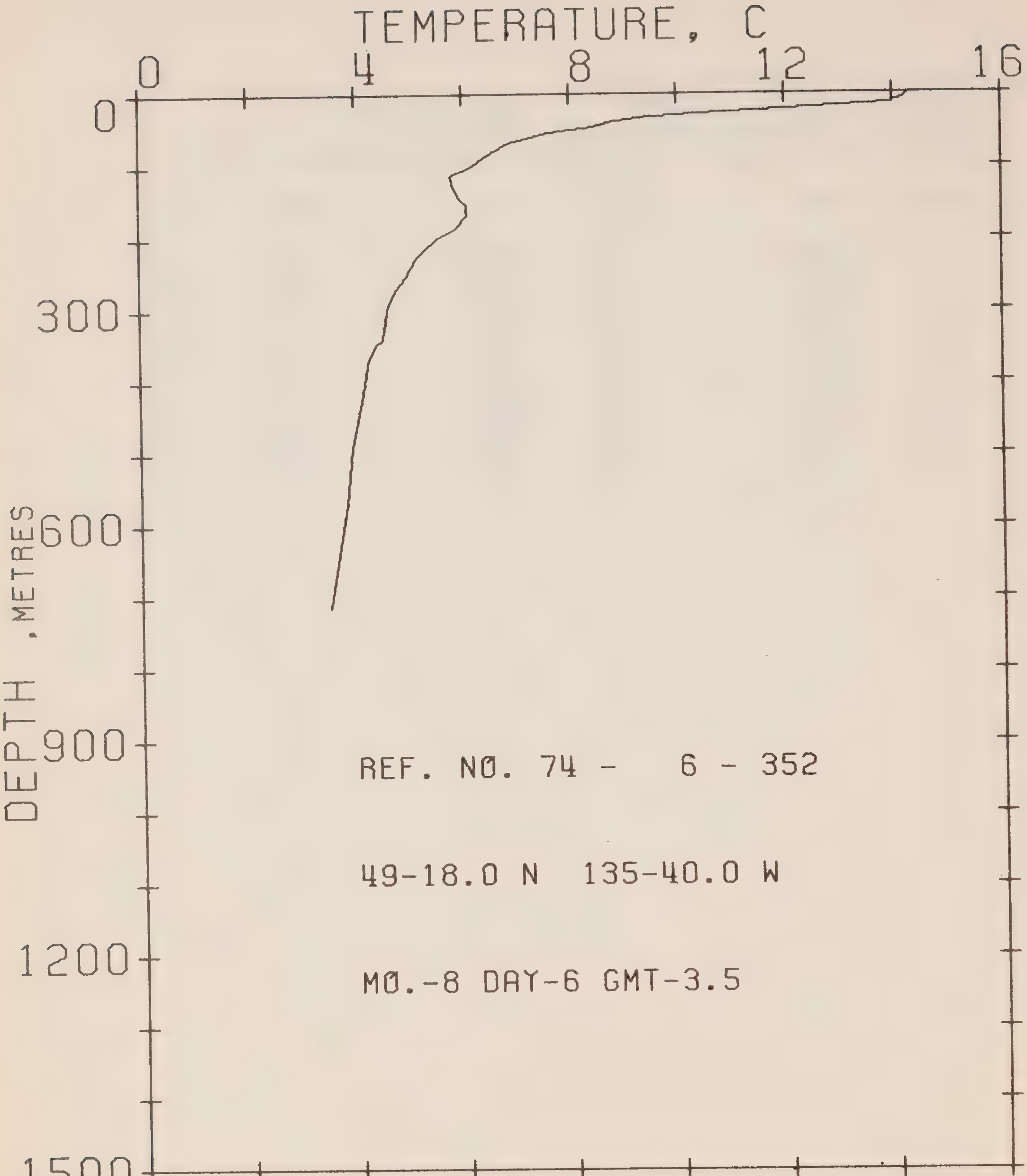
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6-350 DATE 5- 8-74
POSITION 49-26.0N 137-40.0W GMT 22.0
RESULTS OF XBT CAST 30 POINTS TAKEN FROM ANALCG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
3	13.57	68	6.67	256	4.53
12	13.41	80	6.00	294	4.31
26	13.39	91	5.61	338	4.09
28	13.34	98	5.38	391	3.97
32	10.14	119	5.41	456	3.83
36	9.36	124	5.52	503	3.77
44	8.45	151	5.54	559	3.58
51	7.92	167	5.35	615	3.51
53	7.91	185	5.06	681	3.47
56	7.54	228	4.73	751	3.32


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NO. 74 - 6 - 351
49-23.0 N 136-41.0 W
MO.-8 DAY-6 GMT-0.8

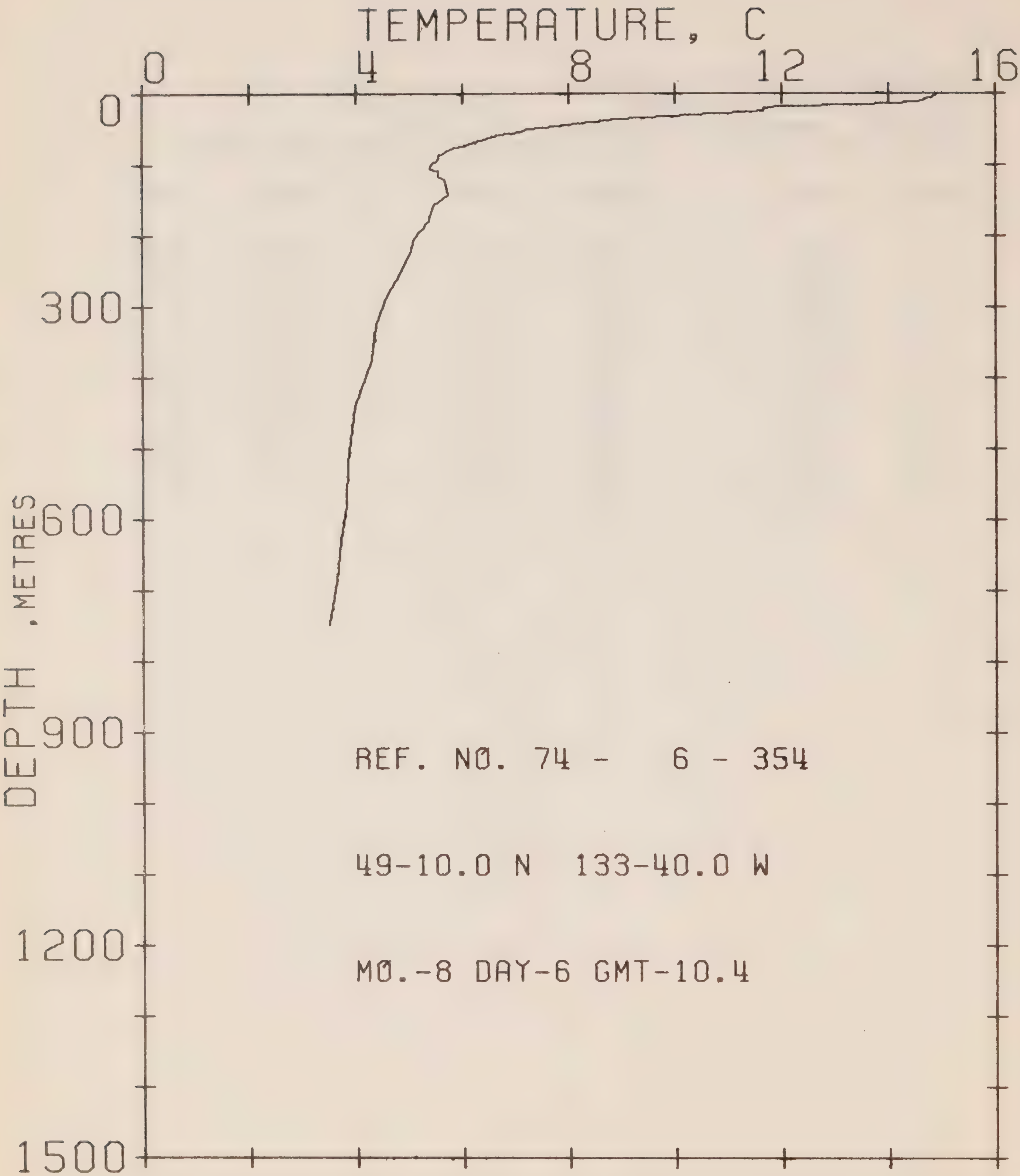
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6-351 DATE 6- 8-74
POSITION 49-23.0N 136-41.0W GMT 0.8
RESULTS OF XBT CAST 30 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
2	13.68	83	5.95	261	4.61
7	13.68	94	5.63	290	4.41
19	13.44	102	5.42	311	4.31
24	11.29	113	5.32	355	4.13
28	9.47	138	5.45	430	3.96
37	8.80	155	5.51	495	3.85
42	8.38	176	5.53	560	3.68
48	8.17	194	5.32	623	3.56
61	7.49	219	5.07	694	3.45
74	6.54	242	4.87	750	3.27


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NØ. 74 - 6 - 352
49-18.0 N 135-40.0 W
MØ.-8 DAY-6 GMT-3.5

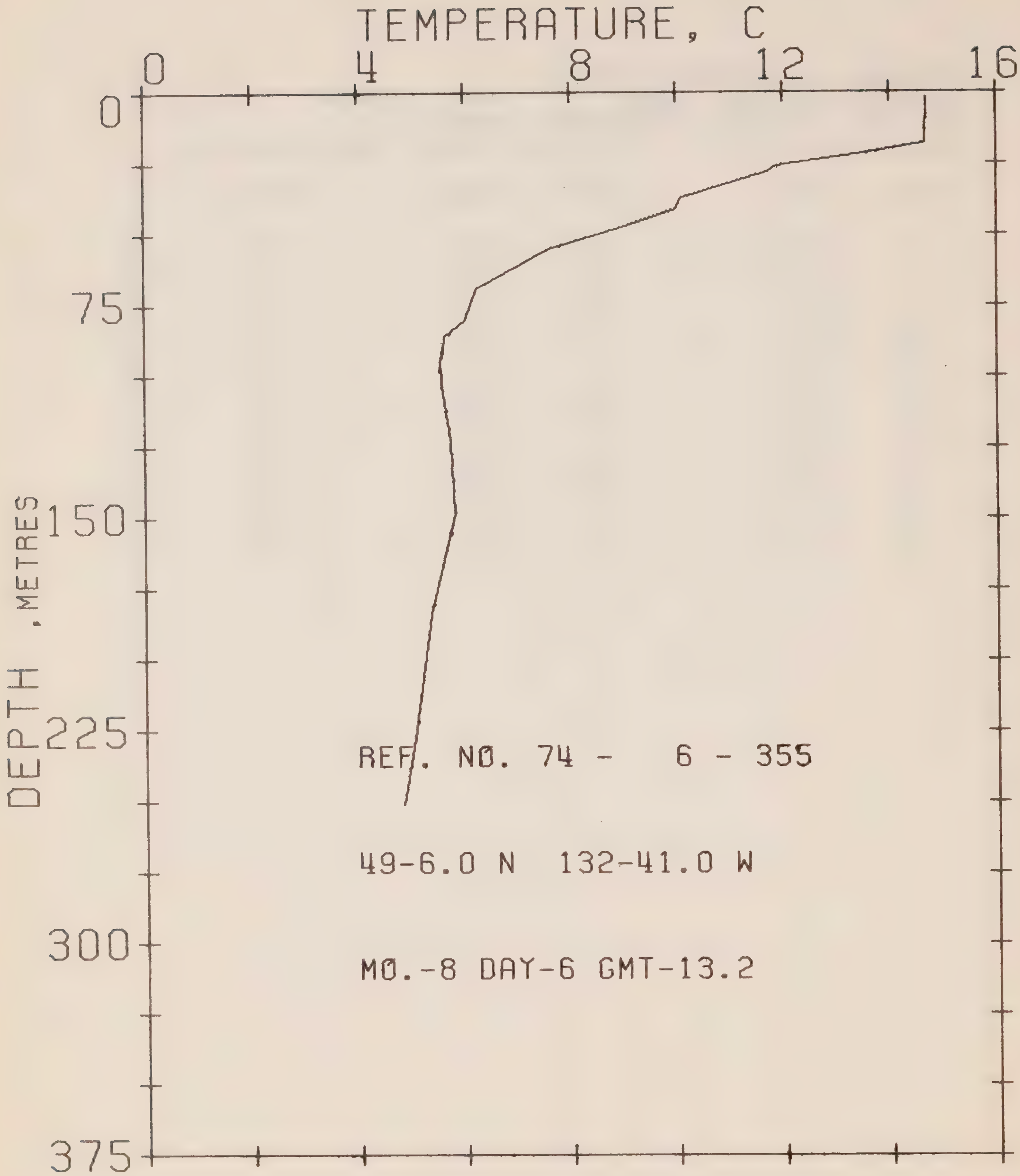
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6-352 DATE 6- 8-74
POSITION 49-18.0N 135-40.0W GMT 3.5
RESULTS OF XBT CAST 35 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
1	14.29	88	6.37	270	4.72
8	14.19	102	6.10	293	4.55
10	14.03	112	5.77	341	4.44
15	13.98	126	5.77	347	4.33
22	11.99	144	5.93	369	4.16
28	10.34	154	6.04	417	4.04
34	9.19	168	6.04	493	3.81
36	9.14	186	5.82	570	3.70
39	8.82	200	5.49	642	3.52
46	8.45	214	5.27	715	3.35
54	7.60	226	5.11	751	3.35
69	6.85	254	4.89		


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NØ. 74 - 6 - 354
49-10.0 N 133-40.0 W
MØ.-8 DAY-6 GMT-10.4

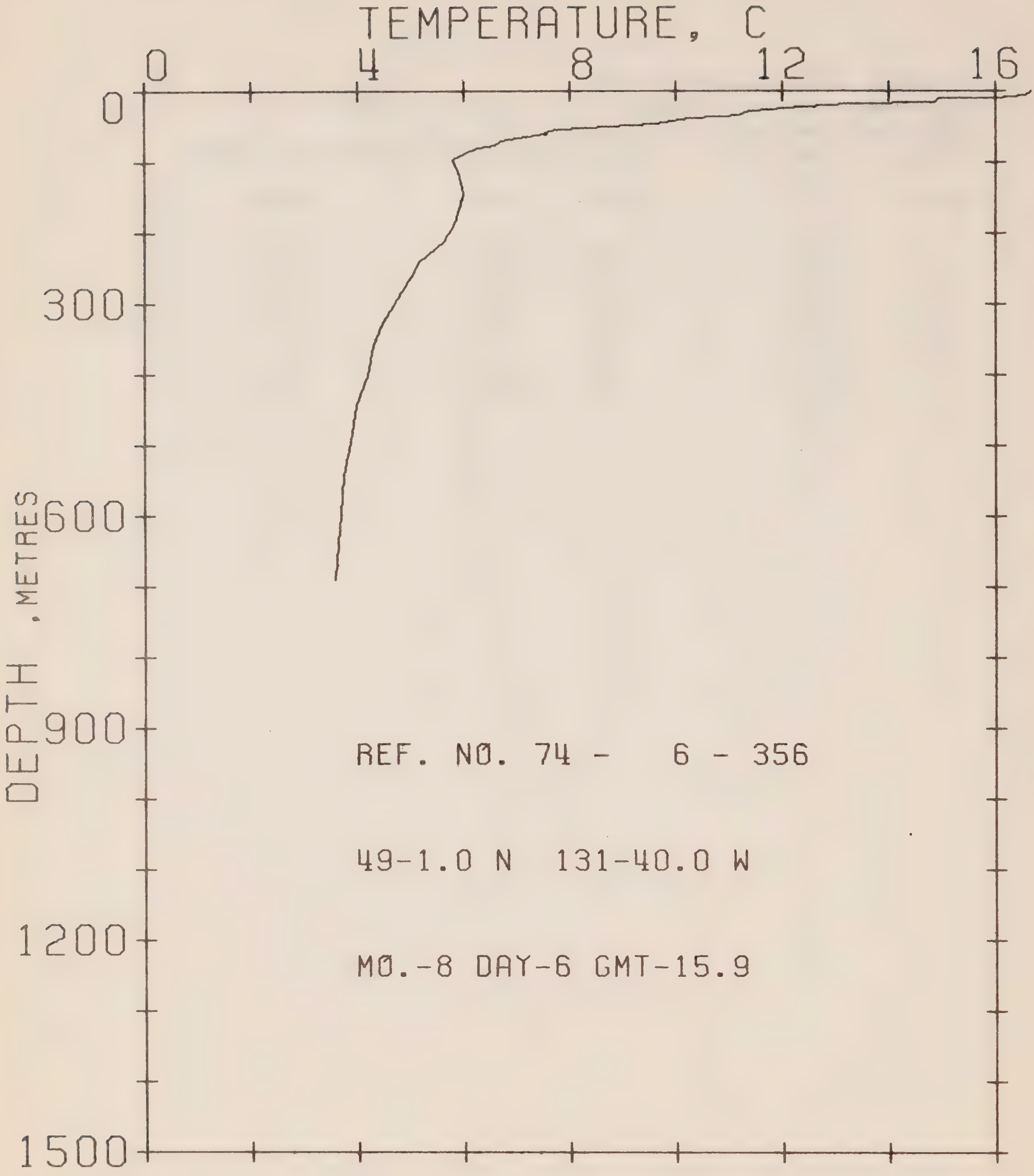
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6-354 DATE 6- 8-74
POSITION 49-10.0N 133-40.0W GMT 10.4
RESULTS OF XBT CAST 42 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
0	14.85	48	7.45	157	5.36
5	14.80	51	7.13	180	5.25
7	14.70	54	7.02	204	4.98
12	14.49	58	6.60	227	4.87
16	13.42	72	6.00	265	4.60
19	11.94	79	5.68	285	4.43
21	11.63	88	5.46	326	4.22
24	11.58	93	5.46	376	4.11
26	11.32	98	5.35	442	3.78
28	10.70	106	5.30	520	3.62
34	9.35	108	5.46	580	3.57
37	8.77	116	5.46	630	3.46
39	8.67	121	5.57	689	3.36
42	8.09	142	5.63	749	3.20


TEMPERATURE, C
0
4
8
12
16
0
75
150
225
300
375
DEPTH ,METRES
REF. NO. 74 - 6 - 355
49-6.0 N 132-41.0 W
MO.-8 DAY-6 GMT-13.2

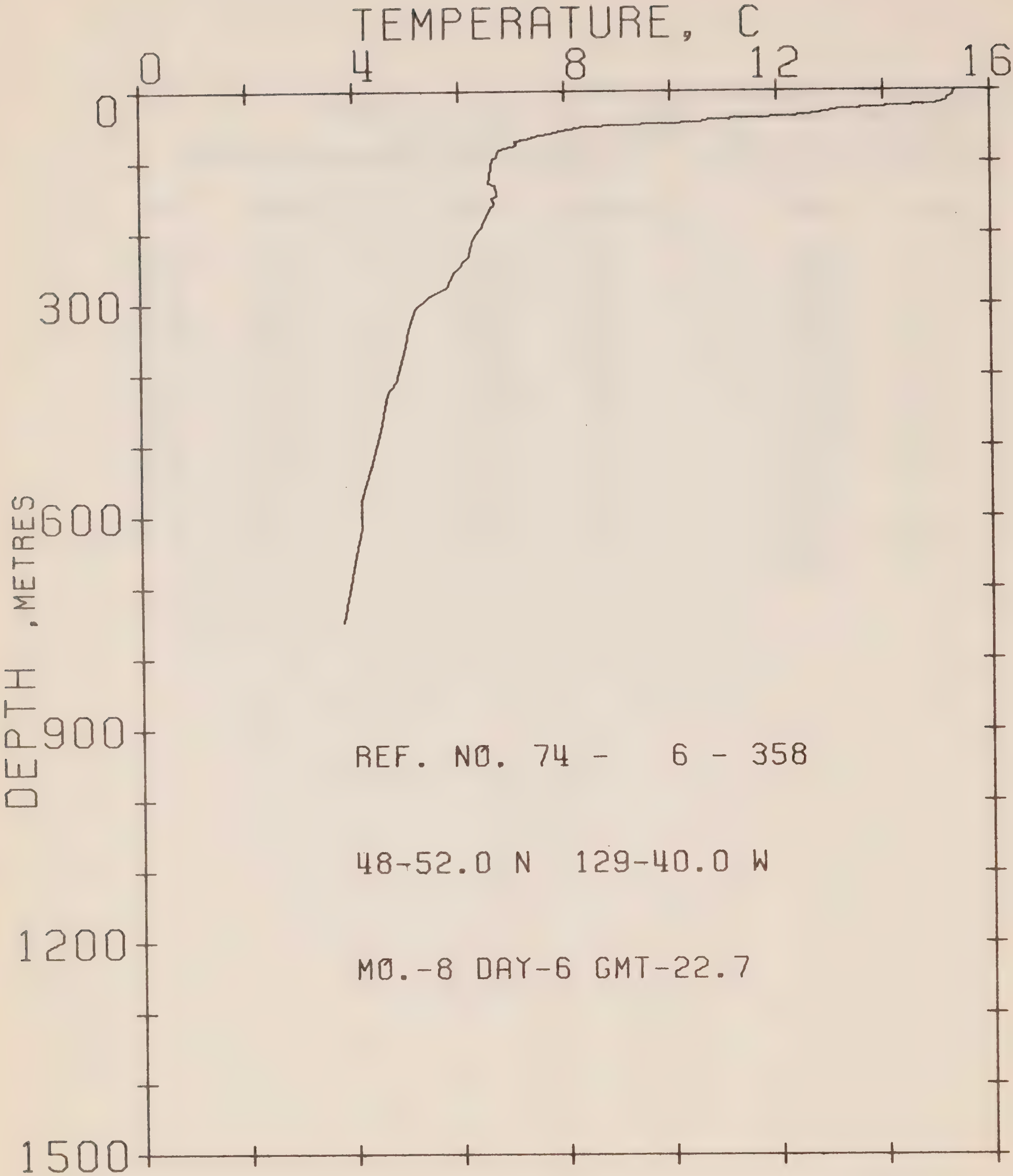
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6-355 DATE 6- 8-74
POSITION 49- 6.0N 132-41.0W GMT 13.2
RESULTS OF XBT CAST 22 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
2	14.70	55	7.59	123	5.71
18	14.66	69	6.21	149	5.78
22	13.34	80	6.00	167	5.52
26	11.85	86	5.62	184	5.32
28	11.70	92	5.57	210	5.12
37	10.10	95	5.52	228	4.97
41	10.00	103	5.53	251	4.76
48	8.86				


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NØ. 74 - 6 - 356
49-1.0 N 131-40.0 W
MØ.-8 DAY-6 GMT-15.9

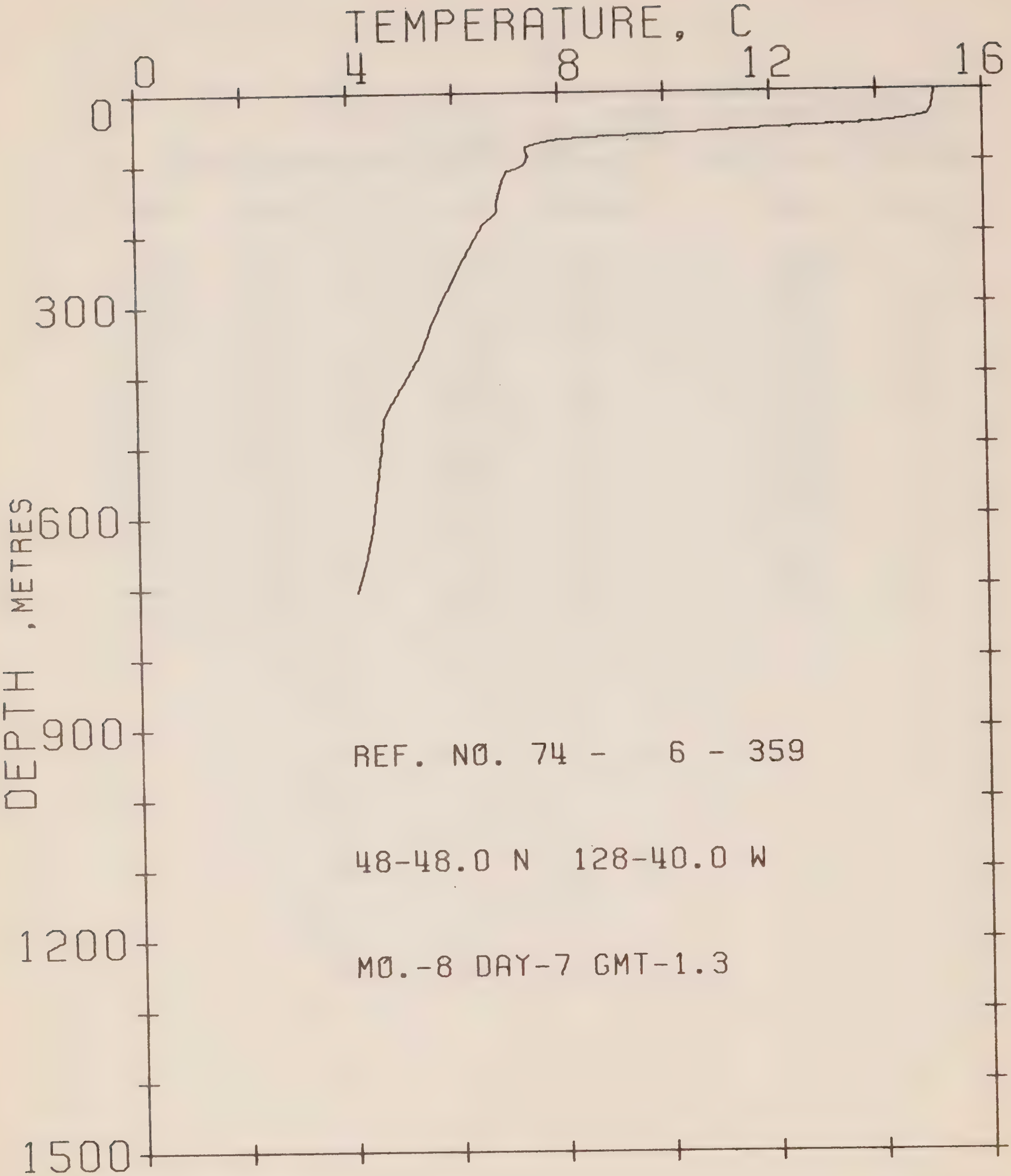
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6-356 DATE 6- 8-74
POSITION 49- 1.0N 131-40.0W GMT 15.9
RESULTS OF XBT CAST 40 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
1	16.67	55	7.75	241	5.10
6	16.57	57	7.59	263	4.93
10	16.01	60	7.53	294	4.64
11	14.94	68	6.84	331	4.35
17	14.84	71	6.67	360	4.18
19	13.26	76	6.57	402	4.05
23	12.39	81	6.24	444	3.82
28	11.41	88	5.97	496	3.69
31	11.26	97	5.75	545	3.56
35	11.15	115	5.85	600	3.48
37	10.84	146	5.95	641	3.41
39	10.22	187	5.77	691	3.34
46	9.59	213	5.55	751	3.26
52	8.28				


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NØ. 74 - 6 - 358
48-52.0 N 129-40.0 W
MØ.-8 DAY-6 GMT-22.7

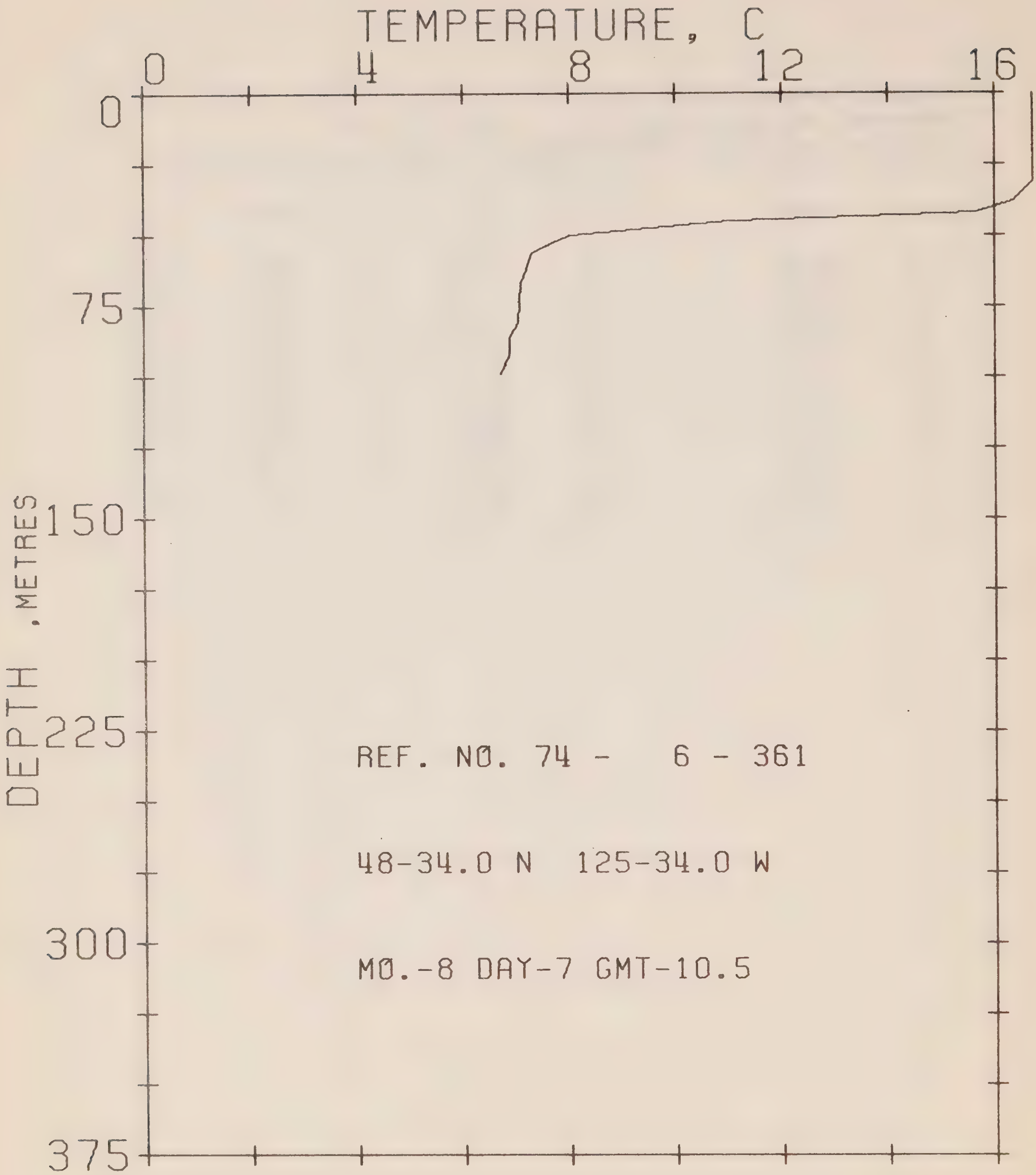
OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6-358 DATE 6- 8-74
POSITION 48-52.0N 129-40.0W GMT 22.7
RESULTS OF XBT CAST 48 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
1	15.36	64	7.36	232	6.12
9	15.31	66	7.37	255	5.82
11	15.22	71	7.05	275	5.68
16	15.17	77	7.06	290	5.32
20	14.92	83	6.74	306	5.07
22	14.16	92	6.70	336	4.94
24	13.91	96	6.60	361	4.86
27	13.20	130	6.53	410	4.65
33	12.75	132	6.64	426	4.51
37	12.24	149	6.66	479	4.35
41	10.75	151	6.56	531	4.15
45	10.55	157	6.62	577	3.93
48	9.04	160	6.62	616	3.92
51	8.36	162	6.57	655	3.81
56	7.94	189	6.39	707	3.66
61	7.68	208	6.20	749	3.55


TEMPERATURE, C
0
4
8
12
16
0
300
600
900
1200
1500
DEPTH ,METRES
REF. NØ. 74 - 6 - 359
48-48.0 N 128-40.0 W
MØ.-8 DAY-7 GMT-1.3

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6-359 DATE 7- 8-74
POSITION 48-48.0N 128-40.0W GMT 1.3
RESULTS OF XBT CAST 35 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
2	15.05	101	7.26	331	5.37
28	14.99	107	7.15	364	5.20
36	14.89	110	6.94	392	4.97
41	14.63	127	6.83	438	4.58
46	13.92	154	6.71	463	4.40
52	12.03	168	6.71	504	4.34
58	10.27	186	6.44	572	4.21
63	8.91	207	6.27	618	4.09
67	7.96	235	6.05	666	3.96
70	7.64	251	5.93	706	3.78
75	7.32	280	5.71	751	3.66
95	7.32	304	5.54		


TEMPERATURE, C
0
4
8
12
16
0
75
150
225
300
375
DEPTH ,METRES
REF. NØ. 74 - 6 - 361
48-34.0 N 125-34.0 W
MØ.-8 DAY-7 GMT-10.5

OFFSHORE OCEANOGRAPHY GROUP
REFERENCE NO. 74- 6-361 DATE 7- 8-74
POSITION 48-34.0N 125-34.0W GMT 10.5
RESULTS OF XBT CAST 15 POINTS TAKEN FROM ANALOG TRACE

DEPTH	TEMP	DEPTH	TEMP	DEPTH	TEMP
0	16.62	45	10.93	67	6.97
31	16.60	50	7.89	81	6.91
38	16.24	53	7.51	86	6.74
42	15.53	56	7.19	92	6.74
43	14.15	62	7.08	99	6.57

SURFACE TEMPERATURE AND SALINITY OBSERVATIONS

(P-74-6)

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
CRUISE REFERENCE NUMBER 74- 6

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
74	6	21	2230	29.739	11.4	125-33
74	6	22	100	31.450	12.2	126- 0
74	6	22	300	31.761	11.9	126-40
74	6	22	643	31.830	12.2	127-40
74	6	22	1053	32.008	12.3	128-40
74	6	22	1525	32.375	11.7	129-40
74	6	22	1805	32.563	11.0	130-40
74	6	22	2234	32.457		131-40
74	6	23	315	32.474		132-40
74	6	23	545	32.467	10.1	133-40
74	6	23	945	32.527	9.7	134-40
74	6	23	1230	32.585	9.5	135-40
74	6	23	1600	32.549	9.3	136-40
74	6	23	1915	32.557	9.0	137-40
74	6	23	2150	32.576	9.0	138-40
74	6	24	115	32.593	9.1	139-40
74	6	24	400	32.581	8.4	140-40
74	6	24	1015	32.582	8.4	142-40
74	6	25	0	32.565	8.2	ON STATION
74	6	26	0	32.676	7.5	ON STATION
74	6	27	0	32.677	7.5	ON STATION
74	6	28	0	32.683	7.5	ON STATION
74	6	29	0	32.673	7.5	ON STATION
74	6	30	35	32.667	7.7	ON STATION
74	7	1	0	32.640	8.0	ON STATION
74	7	2	0	32.649	8.2	ON STATION
74	7	3	100	32.623	8.5	ON STATION
74	7	4	0	32.641	8.7	ON STATION
74	7	5	0	32.654	9.1	ON STATION
74	7	6	30	32.640	9.3	ON STATION
74	7	7	0	32.636	8.9	ON STATION
74	7	8	0	32.653	9.3	ON STATION
74	7	9	0	32.639	9.4	ON STATION
74	7	10	0	32.626	9.5	ON STATION
74	7	11	100	32.562	9.8	ON STATION
74	7	12	0	32.612	9.4	ON STATION
74	7	13	200	32.616	10.0	ON STATION
74	7	14	0	32.644	10.6	ON STATION
74	7	15	230	32.641	10.9	ON STATION
74	7	16	0	32.660	10.5	ON STATION
74	7	17	0	32.624	10.9	ON STATION
74	7	18	0	32.639	10.5	ON STATION
74	7	19	0	32.630	10.8	ON STATION
74	7	20	0	32.627	10.4	ON STATION
74	7	21	0	32.615	10.3	ON STATION

SURFACE SALINITY AND TEMPERATURE OBSERVATIONS
CRUISE REFERENCE NUMBER 74- 6

DATE/TIME				SALINITY	TEMP	LONGITUDE
YR	MO	DY	GMT	0/00	C	WEST
74	7	21	0	32.615	10.3	ON STATION
74	7	22	200	32.608	10.3	ON STATION
74	7	23	0	32.595	10.5	ON STATION
74	7	24	0	32.607	10.2	ON STATION
74	7	25	0	32.615	10.4	ON STATION
74	7	26	0	32.606	11.0	ON STATION
74	7	27	0	32.592	11.9	ON STATION
74	7	28	30	32.589	11.7	ON STATION
74	7	29	0	32.597	12.0	ON STATION
74	7	30	0	32.633	11.7	ON STATION
74	7	31	0	32.588	11.1	ON STATION
74	8	1	0	32.602	10.8	ON STATION
74	8	2	0	32.660	11.1	ON STATION
74	8	3	0	32.624	10.9	ON STATION
74	8	4	0	32.591	11.0	ON STATION
74	8	5	0	32.542	11.7	ON STATION
74	8	5	515	32.586	11.6	142-40
74	8	5	840	32.565	12.2	141-40
74	8	5	1230	32.567	12.3	140-40
74	8	5	1532	32.581	12.6	139-40
74	8	5	1830	32.555	12.9	138-40
74	8	5	2205	32.510	13.7	137-40
74	8	6	50	32.526	13.7	136-40
74	8	6	330	32.563	14.3	135-40
74	8	6	645	32.432	14.2	134-40
74	8	6	1022	32.378	14.9	133-40
74	8	6	1315	32.454	14.7	132-40
74	8	6	1555	32.479		131-40
74	8	6	1850	32.532	14.9	130-40
74	8	6	2240	32.232	15.4	129-40
74	8	7	120	32.166	15.2	128-40
74	8	7	410	31.796	13.7	127-40
74	8	7	725	31.890		126-40
74	8	7	1030	29.884		125-33

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OBSERVATIONS OF SEAWATER TEMPERATURE AND SALINITY AT BRITISH COLUMBIA SHORE STATIONS 1973

L.F. Giovando and H.J. Hollister

ENVIRONMENT CANADA
Fisheries and Marine Service
Marine Sciences Directorate
Pacific Region
1230 Government St.
Victoria, B.C.

MARINE SCIENCES DIRECTORATE, PACIFIC REGION
PACIFIC MARINE SCIENCE REPORT NO. 74-11

OBSERVATIONS OF SEAWATER TEMPERATURE AND SALINITY AT BRITISH COLUMBIA SHORE STATIONS 1973

by

L.F. Giovando and H.J. Hollister

Victoria, B.C.
Marine Sciences Directorate, Pacific Region
Environment Canada

October 1974

Fig. 1. Locations of shore stations making daily oceanographic observations in 1973.

Table 1. List of stations making oceanographic observations in 1973. Locations, and names of observers.

Station	Location	Observer
Langara Island	Dixon Entrance, south side	S.G. Westhaver T.A. Carr
Bonilla Island	Hecate Strait, north	W.F. McIlroy
McInnes Island	Milbanke Sound entrance north side	D.S. Collette (Miss) J.M. Collette T. Borowski
Cape St. James	Queen Charlotte Islands, south end	J.M. Godin (Mrs.) N.R. Wilson D.L. Kupillas
Egg Island	Smith Sound, southern entrance	E.R. Carson S. Bell (Mrs.)
Pine Island	Queen Charlotte Strait, western entrance	M.I. Nelson (Mrs.) V.C. Emrich (Mrs.)
Kains Island	Quatsino Sound entrance, north side	L.C. Collins (Mrs.) J. Coldwell
Amphitrite Point	Barkley Sound, western entrance	O.A. Edwards
Sheringham Point	Juan de Fuca Strait northern shore	E.S. Bruton (Mrs.)
Race Rocks	Juan de Fuca Strait, eastern end	A.A. Anderson (Miss)
Cape Mudge	Strait of Georgia, northern entrance	C.W.A. Egg
Sisters Island	Strait of Georgia, central	W. Milne I.G. McNeil J. Carreck L.E. Sharland
Chrome Island	Strait of Georgia, central western shore	W.E. Gardner T. Haraldson
Entrance Island	Strait of Georgia, central western shore	E. Cehak (Mrs.)
Departure Bay	Strait of Georgia, central western shore	F.R.B. Personnel
Active Pass	Strait of Georgia, southwestern shore	J.E. Ruck

Observations of Seawater Temperature and Salinity at British Columbia Shore Stations in 1973

by

L.F. Giovando and H.J. Hollister

Introduction

Daily observations of sea-surface temperature and salinity have been made since the early 1930's at numerous locations along the British Columbia coast. During 1973, observations were made at 16 shore stations (Fig. 1). Table 1 lists the stations in a north-to-south order, together with their general locations, and the names of the observers involved. Most of the sampling sites are at lightstations, and the voluntary services of the lightkeepers as observers have been obtained by arrangement with the Ministry of Transport. The Cape St. James station is a combined radiobeacon and meteorological station, and the services of the staff there were obtained through the kind permission of the Regional Director, Atmospheric Environment Service. The observers receive a payment for their work.

This report presents the data obtained from these shore stations during 1973.

Observational Equipment and Procedures

Each daily observation is made within one hour before (and as near as possible to) the occurrence of the daytime high tide. The exact time is dependent both upon weather conditions and upon the press

of the observer's lightkeeping duties. No observations are attempted in darkness.

The characteristics monitored are those at a depth of 3 feet (0.9 metres). Sea-water temperatures are measured by means of a mercury-in-glass thermometer having a temperature range of 30° to 85° Fahrenheit(F); it is graduated in 0.5° intervals. The temperatures are estimated to 0.1°. The maximum index scale error is $\pm$0.3°. The thermometer is mounted in a protective case.

At all sites except Cape St. James and Sheringham Point, a 25-oz. (710 cc) seawater sample is collected at the same time as the temperature is recorded, for use in the measurement of density by means of a hydrometer. The hydrometers employed are similar to those whose use was initiated at its tidal stations by the U.S. Coast and Geodetic Survey (U.S.C.&G.S.) - since 1970 a part of the National Ocean Surveys of the National Oceanographic and Atmospheric Administration (N.O.A.A.). The "hydrometer-reading" techniques utilized are those described in the U.S.C.&G.S. Hydrographic Manual (Adams, 1942). All hydrometers used here are calibrated, and the appropriate corrections applied to the readings obtained.

The time of each daily observation, the seawater temperature and the hydrometer reading are recorded on "monthly" record forms which are at present mailed to the Pacific Environment Institute, West Vancouver, British Columbia, for preliminary processing.

Accuracy of the Data

In the published output, the values of sea temperatures listed are those reported by the observers. Data are rejected outright only when it is discovered that a faulty thermometer has been used. The accuracy of individual readings sould be $\pm 0.3°F$. The hydrometer readings are reduced to densities at the "standard" temperature of 15°Celsius(C), (59°F.) by means of tables prepared by Zerbe and Taylor (1953). These densities in turn provide corresponding salinity values. Field comparisons involving several dozen samples have indicated that about 85% of the "hydrometer" salinity data agreed, to within $\pm 0.3^0/_{00}$, with corresponding values determined by salinometer (Hollister, unpublished). Abnormal salinity values were rejected when they were indicated obviously to result from incorrect reading of the hydrometer.

Machine Processing of the Data

The daily temperature and salinity data are processed into final form by the Marine Environmental Data Service (MEDS) in Ottawa, Ontario.

From each month's series of daily observations at a station, the monthly-mean value of temperature and of salinity, as well as the corresponding standard deviations, are computed. The means are "rounded off" to the first decimal place. The values of standard deviation have been truncated at the second decimal place. Asterisks immediately preceding a non-zero value denote interpolation (see page 5). Periods of greater than two consecutive days of "missed" data (whether planned or involuntary)

are indicated by daily "*0.0" entries in the tabulations. Invalid days such as April 31 are denoted by a "0.0" entry.

A form of smoothing has been performed on the data to minimize the effect of any "high-frequency" variability (that resulting from tides, etc.). The daily values at each sampling station have been here considered to be equally-spaced in time, with a sampling interval, therefore, of 24 hours. A seven-day, normally-weighted running mean (e.g. Holloway, 1958) has been utilized for smoothing; this form of filtering is considered to result in an output free of such defects as "polarity reversals" or phase shifts. The running means of the daily temperature and salinity data for the entire year have been computed at MEDS. An automatic plot of these means has been obtained. (A copy of the computer program involved is available from The Pacific Environment Institute, West Vancouver.)

Presentation of the Data

The first major section of the report subsequent to the introductory text presents, in monthly format for each sampling location, the daily values of temperature (°F) and of salinity (ppt, $^0/_{00}$) - pp.9 to 73. Also included for each month are the mean, maximum and minimum values, the standard deviation (STD DEV.) and the number of observations involved (OBSVNS). The listing for December includes in addition the annual (YRLY) means. The station listings are arranged in the same geographical order as are the locations given in Table 1. The latitude and longitude of each station are noted immediately following its designation. (The pages of this section are direct-image copies of the computer output.)

For ease in reference, the monthly- and annual-mean temperatures and salinities are summarized in Tables 2 and 3 respectively. Temperatures in Table 2 are given in °C (rounded to the first decimal place) rather than in °F, in deference to the rapidly-increasing use of the Celsius system of temperature measurement in North American marine reporting and use.

Annual graphs of the seven-day, normally-weighted running means for temperature and salinity comprise the second major section of this report (pp. 75 to 107). These graphs are copies of the automatic plots, reduced to "page" size. In order that the graphical output be reasonably continuous, interpolated values have been inserted in any 1-or 2-day periods for which data were not available. Each such interpolated value is designated in the tabulations of the daily data by an immediately-

preceding asterisk. The running-mean computations are interrupted by such an entry and there is a resultant "gap" in the relevant plot.

It may be noted that an extensive bibliography of relevant papers and articles, as well as a list of previous data records for all B.C. shore stations, are included in a report by Hollister and Sandness (1972); the publication deals primarily with the monthly- and annual-mean temperature and salinities for the period 1914-70.

Acknowledgements

We are very grateful to the observers for their cooperation and efforts. They have maintained a remarkable continuity in the data, despite stormy weather and often-hazardous conditions at the sampling locations. Excellent assistance was received from the District Managers and staffs of the Marine Transportation Division, Ministry of Transport, in Victoria and Prince Rupert, as well as from the M.O.T. Radio Branch, who have transmitted the numerous messages concerning the program.

References

Adams, K.T., 1942: Hydrographic manual. Rev. ed. U.S. Coast and Geodetic Survey. Special Publication No. 143.

Holloway, J.L.jr., 1958: Smoothing and filtering of time series and space fields. Advances in Geophysics, Vol.4,pp.351-389.

Hollister, H.J., A.M. Sandnes, 1972: Sea Surface temperatures and salinities at shore stations on the British Columbia coast, 1914-70. Victoria, Marine Sciences Directorate. Pacific Marine Science Report 72-13.

Zerbe, W.B., C.B. Taylor, 1953: Sea Water temperature and density reduction tables. U.S. Coast and Geodetic Survey. Special Publication No. 298.

Table 2. Monthly- and annual-mean temperatures (°C) in 1973.

Station	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec	Ann
Langara I.	5.9	6.2	6.4	7.1	8.1	9.3	10.6	11.7	11.7	10.2	6.8	6.6	8.4
Bonilla I.	6.1	6.1	6.6	7.9	9.3	10.9	11.8	11.6	11.9	10.0	6.8	6.8	8.9
McInnes I.	5.9	5.8	6.3	7.4	9.1	11.1	12.2	13.2	12.6	10.3	7.2	6.7	9.0
Cape St. James	7.1	7.0	7.4	7.8	8.3	9.3	10.8	12.1	10.8	9.3	7.8	7.3	8.8
Egg I.	6.2	6.3	6.9	7.9	9.6	11.2	12.9	13.1	11.2	9.2	7.0	7.1	9.1
Pine I.	7.2	6.8	6.9	7.6	8.4	8.8	9.2	9.6	9.5	9.1	7.8	7.8	8.3
Kains I.	6.6	6.7	7.6	8.8	10.2	10.8	11.7	12.2	13.2	11.1	8.0	7.4	9.6
Amphitrite Pt.	6.9	7.3	8.5	9.4	10.4	11.6	12.4	12.8	12.6	11.3	9.1	8.8	10.2
Sheringham Pt.	7.0	7.5	8.3	8.7	9.1	9.8	10.9	10.7	10.4	9.4	8.7	8.0	9.1
Race Rocks	7.1	7.3	8.0	8.4	8.7	9.3	10.1	10.4	10.1	9.3	8.3	8.0	8.8
Cape Mudge	6.6	6.6	7.5	8.8	10.9	11.8	13.2	12.4	12.2	10.1	7.7	7.3	9.8
Sisters I.	6.0	6.1	7.1	8.7	12.1	13.4	16.2	17.0	14.8	11.2	8.1	7.3	10.7
Chrome I.	6.3	6.3	7.3	8.7	11.3	13.0	16.1	17.0	13.7	10.6	8.3	7.4	10.5
Entrance I.	6.3	5.8	7.4	9.4	11.7	13.6	15.8	17.0	14.4	10.9	8.2	7.3	10.6
Departure Bay	5.5	5.7	7.1	9.3	12.2	14.0	16.4	17.4	14.7	10.9	7.6	6.7	10.7
Active Pass	6.3	6.0	7.4	8.9	10.4	12.3	13.9	14.4	12.8	10.3	7.9	7.4	9.9

Table 3. Monthly- and annual-mean salinities (ppt) in 1973.

Station	Jan	Feb	Mar	Apr	May	Jun	July	Aug	Sep	Oct	Nov	Dec	Ann
Langara I.	32.5	32.4	32.5	32.6	32.5	32.5	32.0	32.2	32.0	31.7	32.0	31.8	32.2
Bonilla I.	31.4	30.9	30.8	31.0	31.1	31.1	31.0	31.6	31.2	31.2	30.8	30.9	31.1
McInnes I.	30.2	30.2	30.4	30.5	30.2	29.6	29.9	30.7	30.1	29.5	30.4	30.8	30.2
Egg I.	31.5	31.4	31.4	30.8	30.1	29.5	28.6	29.5	31.1	30.6	31.8	31.6	30.6
Pine I.	31.2	31.3	31.3	31.7	31.8	32.0	32.0	31.9	32.0	32.3	31.8	31.4	31.7
Kains I.	28.8	29.1	29.8	30.3	30.7	31.2	31.9	32.6	32.3	30.7	30.2	28.5	30.5
Amphitrite Pt.	27.7	28.9	29.1	30.4	30.7	29.7	31.2	31.6	31.2	29.6	28.4	27.7	29.7
Race Rocks	31.3	31.1	31.4	31.7	31.9	31.8	31.3	31.6	31.8	31.9	31.6	31.1	31.6
Cape Mudge	28.6	29.0	28.9	29.3	29.3	28.6	28.1	28.3	28.2	28.9	28.7	28.3	28.7
Sisters I.	28.3	28.5	28.6	28.9	28.0	25.6	24.6	26.9	27.9	28.5	28.7	28.5	27.7
Chrome I.	28.4	28.9	28.9	29.2	29.0	28.5	26.5	27.8	28.7	29.3	28.9	28.1	28.5
Entrance I.	28.1	27.7	27.9	28.4	26.8	24.0	23.9	25.1	27.2	28.1	28.1	27.3	26.9
Departure Bay	26.0	27.7	27.5	29.1	27.7	25.2	24.0	26.0	27.9	28.2	26.9	24.3	26.7
Active Pass	28.8	27.6	28.3	28.1	27.4	25.7	25.8	26.9	27.5	28.0	27.8	28.4	27.5

Tabulations of Daily Sea-Surface

Temperature and Salinity

1973

TEMP: Temperature (°F)

SAL: Salinity (ppt, $^{0}/_{00}$)

LANGARA ISLAND 54 15 19 N 133 03 30 W

	JANUARY		FEBRUARY		MARCH	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	43.4	32.5	42.8	32.5	43.3	32.4
2	41.5	32.4	42.9	32.4	43.6	32.4
3	41.4	32.1	42.8	32.4	43.4	32.3
4	42.6	32.1	42.5	32.5	43.6	32.8
5	41.1	32.4	42.1	32.3	43.9	32.5
6	42.3	32.7	42.2	32.4	43.9	32.7
7	42.4	32.4	42.5	32.8	44.0	32.7
8	42.3	32.5	43.3	32.9	44.1	32.5
9	41.9	32.7	42.8	32.5	43.9	32.5
10	42.3	32.5	* 42.4	* 32.6	43.9	32.9
11	43.1	32.7	42.1	32.7	43.2	32.5
12	43.1	32.0	42.2	32.4	43.2	32.5
13	* 43.0	* 32.2	42.3	31.8	43.3	32.5
14	42.8	32.3	43.4	32.4	43.3	32.4
15	42.6	32.4	44.3	32.5	43.0	32.3
16	43.1	32.7	43.9	32.4	43.0	32.4
17	43.1	32.8	43.9	32.7	42.5	32.3
18	42.6	32.7	43.8	32.3	42.3	32.4
19	42.8	32.4	44.1	32.5	43.1	32.3
20	42.8	32.5	44.2	32.3	43.6	32.4
21	43.0	32.1	44.4	32.5	43.9	32.3
22	44.0	32.4	44.0	32.1	44.1	32.4
23	42.7	32.8	* 43.7	* 32.3	44.0	32.3
24	42.6	32.5	43.4	32.5	44.0	32.4
25	42.5	32.8	42.5	32.3	43.8	32.5
26	* 42.4	* 32.8	43.9	32.4	43.6	32.5
27	42.3	32.8	43.6	32.3	43.5	32.7
28	* 42.6	* 32.6	43.3	32.4	43.2	32.5
29	43.0	32.5	0.0	0.0	43.9	32.7
30	42.8	32.5	0.0	0.0	43.6	32.7
31	* 42.8	* 32.5	0.0	0.0	43.8	32.7
MEANS	42.6	32.5	43.2	32.4	43.5	32.5
OBSVNS.	27	27	26	26	31	31
MAXIMUM	44.0	32.8	44.4	32.9	44.1	32.9
MINIMUM	41.1	32.0	42.1	31.8	42.3	32.3
STD.DEV.	.62	.23	.76	.21	.45	.16

LANGARA ISLAND 54 15 19 N 133 03 30 W

	APRIL		MAY		JUNE	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	43.7	32.9	45.7	32.8	47.4	32.5
2	44.2	32.8	45.8	32.1	47.6	32.8
3	44.7	32.5	45.9	32.3	46.6	32.5
4	44.4	32.7	45.7	32.7	47.3	32.7
5	44.7	32.8	45.7	32.5	47.5	32.7
6	* 44.6	* 32.6	46.4	32.8	47.7	32.8
7	44.5	32.4	45.4	32.1	48.1	32.7
8	45.0	32.4	46.3	32.5	47.0	32.5
9	45.1	32.8	44.9	32.8	47.3	32.5
10	44.2	32.5	45.1	32.8	48.3	32.5
11	44.1	32.8	45.0	32.5	47.5	32.7
12	43.6	32.5	46.0	32.4	48.3	32.5
13	44.4	32.8	46.2	32.7	49.5	32.8
14	44.0	33.0	* 46.8	* 32.7	50.3	32.7
15	44.0	32.7	47.3	32.7	48.1	32.3
16	45.1	32.5	47.2	32.5	50.2	32.7
17	45.3	32.7	46.8	32.9	49.2	32.7
18	45.2	32.5	* 47.2	32.4	49.6	32.7
19	45.1	32.8	47.7	32.9	49.4	32.4
20	44.3	32.4	46.8	32.4	51.0	32.3
21	45.3	32.5	48.4	32.4	49.9	32.4
22	45.5	32.7	47.7	32.3	50.5	32.1
23	45.1	32.9	* 47.3	* 32.3	49.0	32.4
24	45.3	32.5	46.9	32.3	49.2	32.1
25	44.7	32.4	47.2	32.3	49.4	32.5
26	44.3	32.3	46.4	32.3	49.4	32.5
27	44.5	32.5	46.9	32.0	48.9	32.4
28	44.6	32.5	46.5	32.7	50.0	32.4
29	45.4	32.5	47.0	32.5	50.6	30.7
30	45.0	32.4	47.8	32.5	50.1	32.1
31	0.0	0.0	47.0	32.7	0.0	0.0
MEANS	44.7	32.6	46.5	32.5	48.8	32.5
OBSVNS.	29	29	28	29	30	30
MAXIMUM	45.5	33.0	48.4	32.9	51.0	32.8
MINIMUM	43.6	32.3	44.9	32.0	46.6	30.7
STD.DEV.	.53	.19	.90	.25	1.23	.39

LANGARA ISLAND 54 15 19 N 133 03 30 W

	JULY		AUGUST		SEPTEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	49.4	32.1	51.7	32.4	51.5	31.8
2	49.8	32.1	52.6	32.5	53.7	31.9
3	49.3	32.0	52.4	32.5	53.5	32.0
4	48.6	32.5	53.3	32.3	53.7	32.5
5	49.3	32.5	52.3	32.4	54.3	32.1
6	48.4	32.1	53.4	32.5	54.9	32.1
7	48.8	32.4	54.2	32.4	53.8	32.0
8	49.9	32.3	53.9	32.0	53.4	31.6
9	50.5	32.3	53.3	32.4	54.5	31.8
10	50.6	31.9	54.6	31.6	53.6	31.9
11	50.4	32.3	54.8	31.4	54.3	32.0
12	51.0	32.4	53.7	32.9	54.0	31.8
13	51.2	32.3	52.7	* 32.9	53.5	32.3
14	53.5	31.2	54.4	* 32.8	52.6	32.5
15	53.3	30.8	53.3	32.7	52.3	32.5
16	54.2	30.8	53.2	31.9	52.5	32.3
17	52.7	31.4	52.5	32.4	52.5	32.8
18	53.5	31.8	52.3	32.0	52.7	32.7
19	51.8	32.1	52.6	* 31.9	54.4	32.8
20	52.5	32.0	53.3	31.8	52.3	32.8
21	52.5	32.0	50.7	31.9	54.0	32.3
22	49.6	32.1	51.0	32.1	53.8	31.9
23	50.0	31.5	51.6	31.9	52.2	29.8
24	51.0	32.0	54.2	31.8	51.8	30.4
25	50.8	32.3	53.4	31.9	50.6	31.4
26	51.6	31.6	53.4	32.3	51.3	31.8
27	52.2	32.3	52.0	32.3	52.3	31.6
28	51.6	32.8	52.5	32.3	51.4	31.6
29	52.4	32.9	52.3	32.5	51.7	31.9
30	51.2	32.1	53.2	33.0	52.2	31.9
31	52.6	32.5	52.8	32.7	0.0	0.0
MEANS	51.1	32.0	53.0	32.2	53.0	32.0
OBSVNS.	31	31	31	28	30	30
MAXIMUM	54.2	32.9	54.8	33.0	54.9	32.8
MINIMUM	48.4	30.8	50.7	31.4	50.6	29.8
STD.DEV.	1.58	.50	.99	.38	1.12	.64

LANGARA ISLAND 54 15 19 N 133 03 30 W

	OCTOBER		NOVEMBER		DECEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	51.5	31.9	49.1	31.6	43.2	31.8
2	52.2	32.1	47.1	31.6	44.4	31.5
3	52.7	31.6	45.6	31.6	44.4	31.8
4	51.8	31.6	44.6	32.0	44.9	31.8
5	51.8	31.6	43.9	31.9	43.9	31.6
6	50.4	31.5	43.6	31.9	44.2	31.5
7	50.9	31.4	43.0	32.0	44.2	31.8
8	51.3	31.5	43.2	32.3	43.9	31.8
9	51.3	31.6	43.2	32.1	44.9	31.6
10	52.2	31.9	43.2	32.5	44.0	32.5
11	52.7	32.0	43.4	31.9	44.3	32.0
12	49.9	32.0	44.7	31.9	44.0	32.1
13	49.2	32.0	44.0	31.9	44.4	32.1
14	49.5	32.0	44.4	32.0	44.3	31.8
15	50.3	31.6	* 44.4	* 32.0	44.2	31.6
16	50.2	31.8	44.3	32.0	43.4	31.8
17	50.2	31.8	43.6	32.3	42.6	31.9
18	49.9	31.5	43.6	32.1	43.2	31.9
19	49.9	31.6	43.8	32.0	44.9	31.8
20	50.0	31.8	44.0	32.0	44.7	31.8
21	49.7	31.6	44.6	31.9	44.0	31.9
22	49.2	31.6	43.6	31.2	43.0	32.0
23	49.5	31.6	44.8	32.1	44.0	31.9
24	48.9	31.8	44.9	32.5	43.9	31.6
25	49.2	31.8	45.1	32.0	* 43.8	* 31.7
26	49.8	31.8	44.5	32.4	43.6	31.8
27	50.3	31.6	44.0	31.8	43.2	32.0
28	50.1	31.9	44.0	31.9	44.0	31.8
29	* 49.8	* 32.0	43.8	31.5	43.5	31.8
30	49.6	32.0	43.2	32.0	43.5	31.8
31	48.7	31.5	0.0	0.0	42.4	31.9
MEANS	50.4	31.7	44.3	32.0	43.9	31.8
OBSVNS.	30	30	29	29	30	30
YRLY.MEANS......................................					47.2	32.2
MAXIMUM	52.7	32.1	49.1	32.5	44.9	32.5
MINIMUM	48.7	31.4	43.0	31.2	42.4	31.5
STD.DEV.	1.14	.20	1.26	.29	.64	.20

BONILLA ISLAND 53 29 39 N 130 38 04 W

	JANUARY		FEBRUARY		MARCH	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	44.5	31.6	43.4	31.1	43.0	30.8
2	43.8	31.5	43.5	30.8	42.7	30.8
3	42.5	31.5	43.0	31.1	42.7	31.1
4	43.0	31.6	43.2	31.0	44.2	31.0
5	41.6	31.5	42.3	30.8	43.8	31.0
6	42.0	31.4	43.2	31.1	45.0	31.0
7	42.8	31.6	43.0	31.0	44.4	31.2
8	42.6	31.5	43.0	31.1	44.2	31.0
9	42.2	31.4	42.5	31.0	43.4	30.6
10	42.3	31.5	42.8	31.0	44.5	31.0
11	42.6	31.6	42.8	31.2	44.0	31.0
12	43.1	31.5	41.5	31.2	43.5	30.8
13	43.1	31.6	40.8	31.0	44.0	31.0
14	43.4	31.4	41.5	30.8	44.5	31.0
15	44.0	31.5	43.2	30.8	41.5	30.2
16	43.2	31.1	* 43.6	* 30.8	42.8	30.6
17	43.0	31.0	44.0	30.8	41.5	30.4
18	43.0	31.1	42.8	30.6	42.8	30.8
19	42.1	31.0	43.8	30.4	44.0	30.7
20	42.8	31.1	43.2	30.6	45.0	31.1
21	42.4	31.1	43.6	31.0	46.5	30.7
22	44.2	31.1	43.4	31.0	44.3	30.8
23	44.4	31.5	44.0	29.9	44.2	31.0
24	43.2	31.4	43.8	30.2	45.3	31.2
25	42.8	31.4	43.8	31.0	44.6	30.7
26	43.0	31.2	44.2	31.1	44.0	30.7
27	42.1	31.2	43.8	31.0	45.0	31.0
28	43.0	31.5	42.0	30.6	44.2	30.7
29	43.4	31.6	0.0	0.0	43.5	30.3
30	43.0	31.0	0.0	0.0	44.0	30.7
31	42.6	31.1	0.0	0.0	44.4	31.0
MEANS	43.0	31.4	43.0	30.9	43.9	30.8
OBSVNS.	31	31	27	27	31	31
MAXIMUM	44.5	31.6	44.2	31.2	46.5	31.2
MINIMUM	41.6	31.0	40.8	29.9	41.5	30.2
STD.DEV.	.70	.21	.84	.31	1.05	.25

BONILLA ISLAND 53 29 39 N 130 38 04 W

	APRIL		MAY		JUNE	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	45.4	30.8	46.9	31.0	51.9	31.0
2	44.2	31.1	47.8	30.7	48.0	31.2
3	46.5	31.0	49.2	31.2	50.0	31.2
4	45.8	31.2	49.4	31.5	47.0	31.0
5	45.5	31.0	46.5	30.3	47.5	31.0
6	46.3	31.0	48.5	31.5	48.0	31.1
7	46.5	31.4	* 47.8	* 31.2	48.5	31.2
8	45.8	31.2	47.2	31.0	48.3	31.1
9	45.7	31.4	47.5	31.0	50.8	31.1
10	45.6	31.1	48.2	31.2	51.2	31.1
11	44.5	30.8	48.8	30.7	49.5	30.7
12	45.0	31.0	47.0	30.8	51.0	30.8
13	45.8	31.2	48.2	31.0	51.4	31.1
14	45.8	31.2	50.2	31.1	52.6	31.5
15	46.5	31.1	49.0	31.0	52.2	31.4
16	47.0	31.0	50.5	31.4	53.2	31.8
17	47.8	31.2	51.3	31.1	53.6	31.8
18	47.4	31.2	48.7	31.0	55.0	31.5
19	44.7	30.7	51.6	31.0	54.4	31.5
20	47.3	31.1	48.7	31.0	53.7	31.1
21	47.3	30.8	48.0	31.0	54.5	30.8
22	47.5	30.7	49.0	31.2	55.2	31.0
23	47.8	31.0	47.7	31.1	52.5	30.8
24	47.8	31.1	48.9	31.2	52.8	31.1
25	46.4	31.1	47.7	31.2	53.8	30.8
26	46.2	31.1	49.3	31.0	53.2	31.1
27	46.0	30.8	49.0	31.2	53.2	30.8
28	45.5	30.7	50.5	31.1	54.7	31.0
29	48.0	30.7	48.2	31.0	51.5	30.8
30	47.7	31.2	51.0	31.1	51.8	30.8
31	0.0	0.0	49.0	31.2	0.0	0.0
MEANS	46.3	31.0	48.8	31.1	51.7	31.1
OBSVNS.	30	30	30	30	30	30
MAXIMUM	48.0	31.4	51.6	31.5	55.2	31.8
MINIMUM	44.2	30.7	46.5	30.3	47.0	30.7
STD.DEV.	1.06	.20	1.30	.23	2.40	.29

BONILLA ISLAND 53 29 39 N 130 38 04 W

	JULY		AUGUST		SEPTEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	52.5	31.2	52.5	31.5	52.4	31.4
2	51.8	31.1	55.2	31.6	53.2	31.4
3	51.7	31.2	54.2	31.2	52.2	31.2
4	52.8	31.4	52.5	31.5	52.5	31.6
5	53.0	31.1	52.2	31.6	53.1	31.4
6	53.3	31.4	52.5	31.5	53.2	31.1
7	53.9	31.2	51.6	31.4	53.5	30.6
8	53.8	31.4	52.8	31.6	52.8	30.3
9	51.9	31.2	53.8	31.2	53.2	31.1
10	52.8	31.4	52.4	31.2	54.3	31.0
11	53.1	31.1	53.0	31.2	53.3	30.6
12	53.5	31.4	53.4	31.4	53.5	30.8
13	53.3	31.2	53.2	31.6	54.3	31.0
14	53.5	31.2	53.7	31.8	55.4	31.1
15	53.5	31.5	53.5	31.0	53.5	31.4
16	52.9	31.2	52.5	31.6	53.8	31.4
17	51.6	31.4	51.1	31.8	53.4	31.4
18	52.4	31.5	51.3	32.8	54.0	31.8
19	53.4	30.8	51.0	31.8	54.2	31.8
20	54.7	30.4	52.5	31.9	53.7	31.6
21	54.8	30.2	52.2	31.8	53.8	31.1
22	55.5	30.3	53.4	31.9	54.0	30.6
23	53.6	31.1	52.5	31.4	53.8	30.7
24	54.0	30.2	52.8	31.9	52.8	31.2
25	52.8	30.8	53.0	31.8	51.8	31.1
26	53.5	30.8	52.8	31.4	53.5	30.8
27	53.6	31.1	50.8	31.2	54.0	31.5
28	54.0	30.8	52.8	31.6	53.3	31.4
29	54.3	30.8	53.5	31.6	53.4	31.1
30	52.7	30.4	53.6	31.6	53.6	31.4
31	53.4	31.5	54.8	31.6	0.0	0.0
MEANS	53.3	31.0	52.8	31.6	53.4	31.2
OBSVNS.	31	31	31	31	30	30
MAXIMUM	55.5	31.5	55.2	32.8	55.4	31.8
MINIMUM	51.6	30.2	50.8	31.0	51.8	30.3
STD.DEV.	.90	.39	1.02	.33	.71	.37

BONILLA ISLAND 53 29 39 N 130 38 04 W

	OCTOBER		NOVEMBER		DECEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	53.4	31.4	47.7	31.2	43.9	31.0
2	52.2	31.4	47.5	31.0	* 44.4	* 31.0
3	52.4	31.6	45.2	31.2	44.8	31.0
4	52.2	31.1	44.5	31.0	45.0	31.0
5	51.0	31.0	44.0	31.1	45.0	30.7
6	49.8	31.0	43.8	31.1	44.5	31.0
7	50.0	30.7	43.7	31.1	* 44.6	* 30.7
8	50.8	31.1	44.8	31.0	44.6	30.4
9	50.9	31.4	44.5	30.2	44.5	30.4
10	51.2	31.4	44.7	30.7	45.0	31.0
11	51.7	31.8	45.0	30.4	44.2	30.7
12	50.5	31.0	43.7	31.0	44.4	31.2
13	49.6	31.5	43.0	31.1	44.0	31.2
14	49.7	31.5	43.0	31.1	44.8	31.0
15	48.9	31.1	44.3	30.7	44.5	31.0
16	48.8	31.4	43.2	30.6	44.5	30.7
17	49.3	31.5	43.0	30.6	43.8	31.1
18	49.5	31.2	42.5	30.6	* 44.4	* 31.0
19	49.8	31.2	* 43.2	* 30.4	45.0	31.0
20	49.0	30.8	43.8	30.3	45.1	30.7
21	48.2	31.0	43.2	30.6	44.8	30.7
22	48.0	30.7	44.0	31.1	43.2	31.4
23	48.8	31.8	43.8	30.3	44.5	31.2
24	49.2	31.2	44.2	30.4	43.8	30.8
25	48.2	30.7	44.5	30.7	44.5	31.0
26	* 49.1	* 31.0	44.2	30.7	43.8	31.2
27	50.0	31.2	44.8	30.7	43.3	30.8
28	50.2	31.0	44.7	30.6	43.3	31.1
29	49.8	31.0	44.0	30.8	43.5	30.6
30	48.8	31.5	43.6	30.7	43.2	30.8
31	48.4	31.2	0.0	0.0	41.5	30.4
MEANS	50.0	31.2	44.2	30.8	44.2	30.9
OBSVNS.	30	30	29	29	28	28
YRLY.MEANS......................................					48.0	31.1
MAXIMUM	53.4	31.8	47.7	31.2	45.1	31.4
MINIMUM	48.0	30.7	42.5	30.2	41.5	30.4
STD.DEV.	1.38	.30	1.15	.30	.80	.26

MCINNES ISLAND 52 15 48 N 128 43 10 W

	JANUARY		FEBRUARY		MARCH	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	45.2	31.1	44.2	30.6	42.8	29.8
2	43.2	30.8	42.4	30.0	43.0	30.3
3	42.1	30.0	42.4	30.4	43.1	30.4
4	42.0	30.0	42.0	30.3	43.2	30.3
5	41.0	29.4	41.7	30.4	42.9	30.0
6	41.1	29.7	41.6	29.8	43.0	29.9
7	41.4	30.0	41.7	29.9	43.2	30.2
8	41.1	29.9	42.0	30.4	43.2	30.8
9	42.0	30.4	42.0	30.4	43.2	30.6
10	41.5	30.3	41.8	30.2	43.0	30.7
11	42.1	30.3	42.0	30.3	43.0	30.3
12	42.9	30.4	41.5	30.3	43.4	30.4
13	43.0	30.4	41.8	30.3	42.9	30.3
14	43.1	30.4	42.0	30.4	43.6	30.6
15	44.6	31.2	42.6	30.4	43.0	30.3
16	43.0	30.7	44.0	30.8	43.9	30.8
17	43.6	31.2	44.0	30.4	43.5	30.7
18	43.8	30.8	43.0	30.4	43.5	30.7
19	42.5	30.6	43.0	30.3	43.7	30.8
20	44.2	31.0	43.0	30.3	43.5	30.8
21	43.6	30.7	43.0	30.4	43.6	30.0
22	44.5	30.7	42.9	30.0	43.8	30.3
23	44.9	30.6	42.9	30.0	43.6	30.4
24	43.1	30.7	42.6	29.8	44.3	30.6
25	42.2	29.9	42.6	29.5	43.8	30.0
26	40.5	28.6	42.7	30.0	43.5	29.9
27	41.8	29.1	43.1	30.0	43.8	30.3
28	41.3	28.6	42.9	30.4	43.9	30.2
29	41.8	28.9	0.0	0.0	43.9	30.6
30	42.2	29.5	0.0	0.0	43.9	30.4
31	42.6	29.7	0.0	0.0	44.0	30.7
MEANS	42.6	30.2	42.5	30.2	43.4	30.4
OBSVNS.	31	31	28	28	31	31
MAXIMUM	45.2	31.2	44.2	30.8	44.3	30.8
MINIMUM	40.5	28.6	41.5	29.5	42.8	29.8
STD.DEV.	1.23	.72	.73	.28	.40	.30

MCINNES ISLAND 52 15 48 N 128 43 10 W

	APRIL		MAY		JUNE	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	43.9	30.6	46.7	30.3	50.6	29.9
2	44.1	30.3	46.7	30.6	51.3	30.4
3	44.5	31.0	47.5	30.7	50.0	30.7
4	44.0	30.4	47.8	30.0	49.6	30.8
5	44.4	30.3	47.2	30.4	49.0	30.8
6	45.0	30.0	47.4	30.8	49.1	31.1
7	45.3	29.9	46.6	30.7	49.2	31.1
8	44.8	30.3	46.5	31.0	48.9	30.8
9	45.7	29.8	46.0	30.7	49.3	30.8
10	45.4	29.8	46.8	31.0	50.9	30.4
11	45.0	30.0	46.3	30.7	49.8	30.0
12	44.6	30.3	46.8	30.8	50.8	28.9
13	45.5	30.3	48.7	29.0	51.0	29.0
14	45.3	30.6	51.4	28.1	52.9	26.5
15	44.9	30.3	50.0	29.1	52.8	28.0
16	44.7	30.6	50.0	30.0	53.3	29.1
17	45.7	30.7	49.2	29.7	53.5	29.7
18	45.7	30.7	48.8	30.3	53.4	29.9
19	45.5	30.7	49.4	30.3	54.5	31.1
20	45.2	30.7	48.5	30.7	54.1	27.7
21	45.6	30.7	48.4	30.8	54.6	27.4
22	46.2	30.8	48.5	30.6	54.8	28.4
23	46.2	31.0	47.8	30.6	52.9	28.8
24	46.3	30.7	47.4	30.4	53.5	29.5
25	46.1	30.7	48.4	30.0	54.0	29.5
26	45.7	30.6	49.5	30.2	53.9	29.5
27	45.2	30.6	49.3	30.3	52.3	29.5
28	45.6	30.7	49.8	30.3	52.9	30.0
29	46.4	30.7	51.1	29.8	52.6	30.0
30	46.8	30.6	50.0	28.9	53.6	29.1
31	0.0	0.0	49.7	29.9	0.0	0.0
MEANS	45.3	30.5	48.3	30.2	52.0	29.6
OBSVNS.	30	30	31	31	30	30
MAXIMUM	46.8	31.0	51.4	31.0	54.8	31.1
MINIMUM	43.9	29.8	46.0	28.1	48.9	26.5
STD.DEV.	.73	.33	1.46	.67	1.95	1.17

MCINNES ISLAND 52 15 48 N 128 43 10 W

	JULY		AUGUST		SEPTEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	53.3	29.7	53.0	31.0	53.8	31.2
2	52.0	30.2	58.3	31.4	54.4	31.0
3	53.0	30.6	54.6	31.0	53.3	30.8
4	53.1	30.6	54.6	31.0	55.4	31.1
5	53.2	30.7	58.8	31.1	54.9	31.1
6	52.8	29.7	57.9	31.1	54.6	31.1
7	53.2	30.0	57.9	31.0	54.8	31.0
8	54.4	28.1	57.7	31.5	54.2	31.1
9	53.1	29.8	54.7	30.3	54.5	30.8
10	53.4	29.5	54.9	30.6	55.7	31.2
11	53.9	30.3	56.7	30.7	55.4	30.7
12	53.2	30.4	57.7	30.4	56.2	30.2
13	55.1	30.2	55.4	30.7	55.8	30.0
14	55.3	31.2	54.3	30.4	55.2	28.5
15	55.0	30.6	54.5	30.4	57.1	28.6
16	53.6	30.3	57.2	31.0	56.5	28.2
17	53.7	29.7	55.6	30.4	55.2	28.6
18	53.8	29.7	57.3	30.6	54.5	29.4
19	53.0	30.2	57.0	30.2	55.1	28.5
20	52.7	30.3	55.6	30.4	56.2	28.9
21	52.5	29.9	57.0	30.4	54.1	28.5
22	53.3	30.4	55.8	31.0	54.2	29.1
23	52.5	30.0	56.3	30.8	54.5	30.4
24	54.6	29.5	55.6	30.8	54.6	30.2
25	53.6	29.5	55.6	30.4	54.0	30.0
26	55.4	29.4	55.2	30.6	53.8	31.1
27	56.5	28.2	53.8	30.8	53.5	30.7
28	55.6	29.7	54.9	30.4	53.0	30.4
29	55.8	29.5	53.9	30.7	52.7	30.6
30	55.1	29.9	54.0	30.4	53.0	30.4
31	55.0	30.4	54.5	30.8	0.0	0.0
MEANS	53.9	29.9	55.8	30.7	54.7	30.1
OBSVNS.	31	31	31	31	30	30
MAXIMUM	56.5	31.2	58.8	31.5	57.1	31.2
MINIMUM	52.0	28.1	53.0	30.2	52.7	28.2
STD.DEV.	1.14	.65	1.53	.33	1.08	1.02

MCINNES ISLAND 52 15 48 N 128 43 10 W

	OCTOBER		NOVEMBER		DECEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	53.6	28.1	47.6	29.7	44.0	30.7
2	52.8	28.6	46.1	28.9	44.2	30.8
3	52.9	29.9	44.8	28.8	45.1	31.1
4	51.9	30.0	44.6	29.3	45.1	31.4
5	51.9	29.7	44.2	29.3	44.9	31.1
6	52.3	29.3	44.7	29.7	45.2	31.5
7	52.0	27.4	44.5	29.8	44.8	31.5
8	50.8	24.8	44.4	29.8	44.7	31.1
9	50.2	24.8	44.2	30.2	44.4	31.1
10	51.5	29.5	44.3	30.3	44.6	30.8
11	51.8	30.3	44.5	30.0	43.8	30.7
12	51.6	30.2	44.5	29.0	43.9	30.8
13	51.1	30.6	44.4	29.0	44.3	30.8
14	50.8	30.0	44.2	30.3	44.7	31.4
15	51.0	30.0	44.3	30.6	44.8	31.0
16	50.5	29.8	44.2	30.6	43.9	30.7
17	50.5	30.0	44.1	30.7	43.1	30.0
18	50.0	29.9	43.9	30.6	43.1	30.2
19	50.3	30.3	43.8	30.4	43.8	30.7
20	49.7	30.2	46.7	31.5	44.5	31.1
21	49.7	29.9	45.1	31.1	43.3	30.3
22	49.8	30.6	45.0	30.8	43.0	30.0
23	48.8	28.0	45.3	31.2	43.2	30.2
24	48.8	28.4	45.4	31.1	45.2	31.4
25	48.7	29.3	46.0	31.4	44.9	31.1
26	49.8	30.3	45.2	31.0	43.6	30.4
27	49.8	30.8	46.4	31.8	43.2	30.3
28	49.3	30.3	45.8	31.6	43.6	30.4
29	49.0	31.1	45.2	31.2	43.8	30.7
30	49.0	30.8	44.3	31.0	42.9	30.3
31	48.4	30.2	0.0	0.0	42.4	30.0
MEANS	50.6	29.5	44.9	30.4	44.1	30.8
OBSVNS.	31	31	30	30	31	31
YRLY.MEANS...					48.2	30.2
MAXIMUM	53.6	31.1	47.6	31.8	45.2	31.5
MINIMUM	48.4	24.8	43.8	28.8	42.4	30.0
STD.DEV.	1.38	1.51	.91	.87	.79	.46

CAPE ST JAMES 51 56 18 N 131 00 50 W

	JANUARY		FEBRUARY		MARCH	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	45.0	* 0.0	44.6	* 0.0	44.7	* 0.0
2	45.0	* 0.0	44.4	* 0.0	44.9	* 0.0
3	44.4	* 0.0	44.5	* 0.0	45.3	* 0.0
4	44.1	* 0.0	44.5	* 0.0	45.2	* 0.0
5	44.2	* 0.0	44.4	* 0.0	45.2	* 0.0
6	44.2	* 0.0	44.5	* 0.0	45.4	* 0.0
7	44.6	* 0.0	44.5	* 0.0	45.4	* 0.0
8	44.4	* 0.0	44.5	* 0.0	45.5	* 0.0
9	44.6	* 0.0	44.7	* 0.0	45.3	* 0.0
10	44.5	* 0.0	44.6	* 0.0	45.2	* 0.0
11	45.2	* 0.0	44.6	* 0.0	45.2	* 0.0
12	45.1	* 0.0	44.2	* 0.0	* 45.2	* 0.0
13	44.9	* 0.0	44.1	* 0.0	45.2	* 0.0
14	45.1	* 0.0	44.3	* 0.0	* 45.2	* 0.0
15	44.8	* 0.0	44.4	* 0.0	45.2	* 0.0
16	* 45.0	* 0.0	44.7	* 0.0	44.6	* 0.0
17	45.1	* 0.0	44.8	* 0.0	44.6	* 0.0
18	44.9	* 0.0	45.1	* 0.0	45.1	* 0.0
19	45.0	* 0.0	45.0	* 0.0	45.7	* 0.0
20	45.1	* 0.0	44.8	* 0.0	45.6	* 0.0
21	45.0	* 0.0	45.0	* 0.0	46.2	* 0.0
22	45.2	* 0.0	* 45.0	* 0.0	46.0	* 0.0
23	45.1	* 0.0	45.0	* 0.0	45.8	* 0.0
24	44.5	* 0.0	44.9	* 0.0	45.4	* 0.0
25	44.4	* 0.0	* 44.8	* 0.0	45.6	* 0.0
26	44.6	* 0.0	44.8	* 0.0	45.4	* 0.0
27	44.5	* 0.0	44.9	* 0.0	45.3	* 0.0
28	44.6	* 0.0	44.9	* 0.0	* 45.4	* 0.0
29	44.5	* 0.0	0.0	* 0.0	45.6	* 0.0
30	44.4	* 0.0	0.0	* 0.0	45.5	* 0.0
31	44.4	* 0.0	0.0	* 0.0	45.6	* 0.0
MEANS	44.7	0.0	44.6	0.0	45.3	0.0
OBSVNS.	30	0	26	0	28	0
MAXIMUM	45.2	0.0	45.1	0.0	46.2	0.0
MINIMUM	44.1	0.0	44.1	0.0	44.6	0.0
STD.DEV.	.34	0.00	.27	0.00	.37	0.00

CAPE ST JAMES 51 56 18 N 131 00 50 W

	APRIL		MAY		JUNE	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	45.8	* 0.0	46.2	* 0.0	47.7	* 0.0
2	45.2	* 0.0	46.1	* 0.0	48.3	* 0.0
3	45.5	* 0.0	46.7	* 0.0	48.2	* 0.0
4	45.7	* 0.0	46.4	* 0.0	47.7	* 0.0
5	46.2	* 0.0	46.1	* 0.0	47.4	* 0.0
6	47.0	* 0.0	47.4	* 0.0	48.7	* 0.0
7	46.4	* 0.0	45.7	* 0.0	48.0	* 0.0
8	45.4	* 0.0	46.2	* 0.0	47.7	* 0.0
9	46.1	* 0.0	46.2	* 0.0	48.2	* 0.0
10	45.7	* 0.0	46.7	* 0.0	49.7	* 0.0
11	* 46.0	* 0.0	46.7	* 0.0	* 48.6	* 0.0
12	46.2	* 0.0	46.5	* 0.0	47.4	* 0.0
13	46.2	* 0.0	46.7	* 0.0	48.5	* 0.0
14	45.8	* 0.0	45.3	* 0.0	48.8	* 0.0
15	45.5	* 0.0	47.4	* 0.0	48.0	* 0.0
16	45.8	* 0.0	48.2	* 0.0	49.7	* 0.0
17	45.9	* 0.0	47.7	* 0.0	48.8	* 0.0
18	46.0	* 0.0	46.7	* 0.0	48.4	* 0.0
19	46.3	* 0.0	47.2	* 0.0	49.5	* 0.0
20	46.2	* 0.0	48.0	* 0.0	49.9	* 0.0
21	46.2	* 0.0	47.4	* 0.0	49.6	* 0.0
22	46.2	* 0.0	47.7	* 0.0	49.8	* 0.0
23	46.5	* 0.0	46.9	* 0.0	* 49.2	* 0.0
24	46.8	* 0.0	* 47.4	* 0.0	48.6	* 0.0
25	* 45.9	* 0.0	47.9	* 0.0	48.6	* 0.0
26	45.0	* 0.0	47.5	* 0.0	48.6	* 0.0
27	45.3	* 0.0	46.9	* 0.0	49.3	* 0.0
28	45.4	* 0.0	* 47.3	* 0.0	* 49.8	* 0.0
29	46.5	* 0.0	47.7	* 0.0	50.2	* 0.0
30	46.8	* 0.0	47.3	* 0.0	49.5	* 0.0
31	0.0	0.0	47.2	* 0.0	0.0	0.0
MEANS	46.0	0.0	46.9	0.0	48.7	0.0
OBSVNS.	28	0	29	0	27	0
MAXIMUM	47.0	0.0	48.2	0.0	50.2	0.0
MINIMUM	45.0	0.0	45.3	0.0	47.4	0.0
STD.DEV.	.51	0.00	.72	0.00	.82	0.00

CAPE ST JAMES 51 56 18 N 131 00 50 W

DATE	JULY TEMP	JULY SAL	AUGUST TEMP	AUGUST SAL	SEPTEMBER 1973 TEMP	SEPTEMBER 1973 SAL
1	* 49.4	* 0.0	53.0	* 0.0	53.7	* 0.0
2	49.4	* 0.0	52.5	* 0.0	52.6	* 0.0
3	48.8	* 0.0	* 52.6	* 0.0	53.3	* 0.0
4	49.4	* 0.0	52.6	* 0.0	53.1	* 0.0
5	49.7	* 0.0	53.0	* 0.0	53.2	* 0.0
6	49.2	* 0.0	52.2	* 0.0	53.0	* 0.0
7	49.4	* 0.0	52.8	* 0.0	52.9	* 0.0
8	49.7	* 0.0	53.6	* 0.0	53.2	* 0.0
9	51.2	* 0.0	53.7	* 0.0	51.2	* 0.0
10	50.9	* 0.0	54.3	* 0.0	51.2	* 0.0
11	50.5	* 0.0	54.4	* 0.0	49.9	* 0.0
12	50.2	* 0.0	54.3	* 0.0	51.0	* 0.0
13	50.9	* 0.0	53.5	* 0.0	51.5	* 0.0
14	51.2	* 0.0	53.5	* 0.0	50.6	* 0.0
15	51.3	* 0.0	53.8	* 0.0	51.8	* 0.0
16	53.0	* 0.0	53.7	* 0.0	51.0	* 0.0
17	53.3	* 0.0	54.1	* 0.0	51.3	* 0.0
18	52.7	* 0.0	54.8	* 0.0	51.8	* 0.0
19	52.6	* 0.0	54.9	* 0.0	51.8	* 0.0
20	52.6	* 0.0	54.7	* 0.0	51.8	* 0.0
21	51.4	* 0.0	* 55.1	* 0.0	51.5	* 0.0
22	53.1	* 0.0	55.5	* 0.0	50.3	* 0.0
23	52.5	* 0.0	55.2	* 0.0	51.9	* 0.0
24	52.8	* 0.0	53.7	* 0.0	49.9	* 0.0
25	52.8	* 0.0	53.5	* 0.0	49.9	* 0.0
26	52.9	* 0.0	52.4	* 0.0	49.6	* 0.0
27	53.0	* 0.0	52.8	* 0.0	49.3	* 0.0
28	53.0	* 0.0	55.3	* 0.0	49.7	* 0.0
29	52.9	* 0.0	54.7	* 0.0	49.5	* 0.0
30	52.8	* 0.0	54.3	* 0.0	49.9	* 0.0
31	52.4	* 0.0	54.1	* 0.0	0.0	0.0
MEANS	51.5	0.0	53.8	0.0	51.4	0.0
OBSVNS.	30	0	29	0	30	0
MAXIMUM	53.3	0.0	55.5	0.0	53.7	0.0
MINIMUM	48.8	0.0	52.2	0.0	49.3	0.0
STD.DEV.	1.48	0.00	.92	0.00	1.32	0.00

CAPE ST JAMES 51 56 18 N 131 00 50 W

	OCTOBER		NOVEMBER		DECEMBER	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	49.7	* 0.0	47.1	* 0.0	44.8	* 0.0
2	50.8	* 0.0	47.6	* 0.0	45.4	* 0.0
3	49.6	* 0.0	* 47.2	* 0.0	45.0	* 0.0
4	49.6	* 0.0	46.7	* 0.0	45.3	* 0.0
5	49.9	* 0.0	47.1	* 0.0	* 45.1	* 0.0
6	49.7	* 0.0	46.6	* 0.0	44.9	* 0.0
7	50.2	* 0.0	46.5	* 0.0	44.7	* 0.0
8	51.2	* 0.0	46.0	* 0.0	45.0	* 0.0
9	50.5	* 0.0	45.7	* 0.0	45.1	* 0.0
10	50.3	* 0.0	* 45.8	* 0.0	44.8	* 0.0
11	49.6	* 0.0	45.8	* 0.0	45.4	* 0.0
12	49.5	* 0.0	45.7	* 0.0	45.1	* 0.0
13	50.4	* 0.0	45.6	* 0.0	44.9	* 0.0
14	49.8	* 0.0	45.7	* 0.0	44.8	* 0.0
15	* 49.1	* 0.0	45.7	* 0.0	* 44.9	* 0.0
16	48.4	* 0.0	45.2	* 0.0	45.0	* 0.0
17	48.3	* 0.0	45.5	* 0.0	44.8	* 0.0
18	47.5	* 0.0	45.6	* 0.0	44.9	* 0.0
19	47.8	* 0.0	46.7	* 0.0	* 45.1	* 0.0
20	47.5	* 0.0	47.2	* 0.0	45.3	* 0.0
21	47.2	* 0.0	* 46.4	* 0.0	45.4	* 0.0
22	47.9	* 0.0	45.6	* 0.0	* 45.7	* 0.0
23	47.2	* 0.0	45.4	* 0.0	46.0	* 0.0
24	47.2	* 0.0	* 45.4	* 0.0	45.2	* 0.0
25	47.3	* 0.0	45.3	* 0.0	45.5	* 0.0
26	47.4	* 0.0	45.4	* 0.0	45.7	* 0.0
27	47.5	* 0.0	45.5	* 0.0	45.5	* 0.0
28	47.3	* 0.0	45.2	* 0.0	45.4	* 0.0
29	46.8	* 0.0	44.9	* 0.0	45.8	* 0.0
30	47.3	* 0.0	* 44.8	* 0.0	45.6	* 0.0
31	47.7	* 0.0	0.0	0.0	45.7	* 0.0
MEANS	48.7	0.0	46.0	0.0	45.2	0.0
OBSVNS.	30	0	25	0	27	0
YRLY.MEANS..					47.8	0.0
MAXIMUM	51.2	0.0	47.6	0.0	46.0	0.0
MINIMUM	46.8	0.0	44.9	0.0	44.7	0.0
STD.DEV.	1.37	0.00	.74	0.00	.36	0.00

EGG ISLAND 51 15 06 N 127 49 53 W

	JANUARY		FEBRUARY		MARCH	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	44.1	31.9	42.9	31.5	44.1	31.4
2	43.3	31.5	43.6	31.2	44.0	31.4
3	41.7	31.5	41.9	31.2	45.0	31.4
4	42.2	31.5	42.5	31.5	44.7	31.4
5	41.6	31.4	42.4	31.5	44.2	31.6
6	41.5	31.9	41.0	31.5	44.5	31.6
7	41.5	31.4	42.9	31.0	44.5	31.6
8	41.6	31.2	42.9	31.2	44.5	31.6
9	* 42.0	* 31.5	42.5	31.2	44.5	31.6
10	42.5	31.8	42.3	31.2	44.6	31.6
11	43.8	31.9	42.1	31.2	44.3	31.4
12	44.2	31.6	41.2	31.5	43.5	31.6
13	44.0	31.6	* 42.5	* 31.3	43.0	31.6
14	44.2	31.6	43.8	31.1	44.5	31.4
15	44.1	31.4	43.5	31.4	44.0	31.4
16	44.3	31.4	44.1	31.1	44.3	31.4
17	44.5	31.6	44.0	31.6	43.9	31.2
18	44.8	31.4	43.6	31.5	43.7	31.5
19	43.7	31.6	44.0	31.6	44.1	31.6
20	44.2	31.6	43.4	31.6	44.8	31.4
21	44.1	31.6	43.9	31.6	44.8	31.6
22	43.8	31.4	44.1	31.4	45.1	31.4
23	44.2	31.4	44.3	31.4	44.8	31.1
24	43.2	31.2	44.8	31.2	45.6	31.0
25	42.1	30.7	45.0	31.4	44.4	31.4
26	41.5	31.1	44.6	31.1	44.7	31.1
27	42.6	31.2	44.2	31.4	44.6	31.4
28	43.5	31.4	44.6	31.6	44.2	31.4
29	42.9	31.2	0.0	0.0	44.4	31.4
30	43.5	31.5	0.0	0.0	44.6	31.4
31	43.1	31.5	0.0	0.0	44.7	31.6
MEANS	43.2	31.5	43.3	31.4	44.4	31.4
OBSVNS.	30	30	27	27	31	31
MAXIMUM	44.8	31.9	45.0	31.6	45.6	31.6
MINIMUM	41.5	30.7	41.0	31.0	43.0	31.0
STD.DEV.	1.06	.25	1.08	.19	.49	.16

EGG ISLAND 51 15 06 N 127 49 53 W

	APRIL		MAY		JUNE	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	45.5	31.5	48.9	30.2	50.6	29.5
2	44.5	31.1	49.2	30.0	51.2	29.0
3	45.0	31.4	50.9	29.7	52.4	29.9
4	44.0	30.8	50.1	30.6	50.3	30.3
5	44.1	30.8	47.5	30.3	50.6	29.4
6	45.5	31.0	47.8	30.8	50.5	30.7
7	46.0	31.2	46.9	31.0	50.4	30.3
8	47.7	28.9	47.0	31.4	50.0	30.4
9	48.8	29.0	46.8	31.0	48.9	30.4
10	47.0	28.2	46.2	31.2	51.9	28.6
11	45.5	31.0	47.2	29.7	51.0	30.4
12	45.1	31.1	48.6	29.7	49.8	31.6
13	46.1	31.2	51.2	30.3	49.4	31.5
14	46.0	31.2	51.9	30.2	49.9	31.6
15	45.9	31.2	51.6	28.9	* 51.3	* 30.9
16	45.9	31.5	53.2	29.7	* 52.8	* 30.1
17	45.6	31.5	49.4	30.0	54.3	29.4
18	45.6	31.2	50.6	30.3	52.2	30.7
19	* 45.6	* 31.1	50.4	29.5	53.6	30.3
20	* 45.7	* 30.9	50.2	30.3	56.1	28.9
21	45.8	30.8	47.6	29.9	53.8	27.3
22	46.9	30.7	48.5	30.6	55.3	26.5
23	48.2	30.6	48.3	30.8	53.6	27.8
24	49.3	30.8	46.9	31.1	52.6	29.4
25	47.8	30.8	46.7	31.2	54.4	28.1
26	46.2	30.7	48.2	29.9	54.1	27.8
27	45.8	31.0	50.4	29.5	54.8	28.1
28	46.4	31.0	51.3	29.4	54.3	28.6
29	48.5	30.3	51.1	28.8	53.2	28.9
30	48.7	30.6	51.8	28.1	50.8	30.8
31	0.0	0.0	49.9	30.2	0.0	0.0
MEANS	46.3	30.8	49.2	30.1	52.1	29.5
OBSVNS.	28	28	31	31	28	28
MAXIMUM	49.3	31.5	53.2	31.4	56.1	31.6
MINIMUM	44.0	28.2	46.2	28.1	48.9	26.5
STD.DEV.	1.43	.79	1.90	.76	2.02	1.33

EGG ISLAND 51 15 06 N 127 49 53 W

	JULY		AUGUST		SEPTEMBER	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	53.2	27.1	58.3	29.3	52.1	30.7
2	54.9	28.9	59.6	29.3	52.2	30.6
3	55.2	28.1	57.8	29.8	54.3	29.8
4	54.4	28.4	56.9	29.3	52.1	31.1
5	53.6	27.8	53.7	29.1	52.2	30.3
6	52.6	29.1	52.9	30.2	50.7	31.5
7	* 54.2	* 28.4	53.9	29.9	52.2	31.0
8	55.9	27.8	57.1	29.5	50.4	31.6
9	55.1	26.5	55.2	30.0	50.2	31.9
10	52.9	27.8	* 56.0	* 30.2	51.6	31.8
11	54.6	28.1	56.8	30.3	51.3	31.5
12	55.1	28.1	56.2	30.8	52.6	31.0
13	54.9	28.6	54.2	29.9	53.2	31.1
14	53.6	29.4	57.0	27.7	51.3	31.2
15	52.8	29.9	54.8	28.9	53.8	31.0
16	51.4	31.0	55.1	29.1	55.3	30.8
17	55.2	27.8	56.2	29.8	55.1	30.0
18	55.0	30.0	56.4	29.3	53.1	32.0
19	56.4	30.6	57.9	30.0	52.8	31.8
20	54.4	30.6	55.1	29.8	56.1	30.2
21	55.0	29.4	55.5	27.6	51.3	31.5
22	58.4	28.2	55.4	28.6	51.4	31.5
23	56.2	28.1	56.5	28.1	51.3	31.5
24	55.4	27.6	55.7	27.7	51.1	31.5
25	52.7	29.7	57.8	28.4	49.6	31.9
26	57.4	27.7	56.2	28.5	49.3	31.9
27	57.1	26.7	55.0	29.4	52.2	31.8
28	58.4	27.4	51.3	31.8	50.8	30.6
29	58.6	27.7	52.9	31.2	51.3	31.8
30	57.8	29.0	53.4	31.2	51.4	26.9
31	57.6	30.0	53.6	30.2	0.0	0.0
MEANS	55.2	28.6	55.6	29.5	52.1	31.1
OBSVNS.	30	30	30	30	30	30
MAXIMUM	58.6	31.0	59.6	31.8	56.1	32.0
MINIMUM	51.4	26.5	51.3	27.6	49.3	26.9
STD.DEV.	1.91	1.18	1.86	1.04	1.61	.99

EGG ISLAND 51 15 06 N 127 49 53 W

	OCTOBER		NOVEMBER		DECEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	51.4	30.4	46.7	31.5	43.4	31.6
2	51.1	29.1	46.2	31.2	44.9	31.8
3	51.9	30.7	43.3	31.0	45.3	31.9
4	49.6	30.6	43.1	31.9	44.9	31.9
5	49.4	30.8	42.8	31.9	44.8	31.9
6	48.8	30.6	44.3	31.6	45.0	31.9
7	48.8	29.4	45.3	31.6	44.8	31.9
8	49.3	26.9	44.8	31.4	44.9	32.1
9	48.9	26.0	44.9	31.6	44.9	30.8
10	49.6	27.7	45.1	31.6	45.1	32.1
11	49.8	28.9	46.1	31.5	45.2	31.9
12	48.7	30.8	45.9	31.9	45.0	31.9
13	48.4	30.2	46.0	32.0	45.0	32.1
14	48.2	30.2	45.9	32.0	45.1	31.9
15	47.9	30.3	45.6	32.0	* 44.6	* 31.8
16	48.6	29.9	42.1	31.8	44.0	31.6
17	48.9	31.6	42.6	31.5	43.8	31.6
18	47.9	31.6	41.2	31.8	43.7	31.6
19	47.4	31.9	42.6	31.8	44.0	31.2
20	47.2	31.2	44.9	31.9	44.9	31.2
21	47.4	31.6	45.0	31.9	45.5	31.2
22	47.7	31.9	44.8	32.1	46.0	31.5
23	46.9	31.8	43.9	32.1	46.0	31.5
24	47.2	31.8	44.8	32.1	45.1	30.8
25	46.8	32.0	45.3	31.9	46.4	31.8
26	47.0	31.8	45.2	31.9	44.9	31.2
27	47.9	32.1	* 45.1	* 32.2	43.9	31.1
28	49.6	31.9	45.0	32.4	44.4	31.4
29	47.8	31.9	45.4	32.1	44.0	30.8
30	48.3	31.9	45.0	32.0	43.0	31.0
31	47.6	31.6	0.0	0.0	42.5	31.4
MEANS	48.6	30.6	44.6	31.8	44.7	31.6
OBSVNS.	31	31	29	29	30	30
YRLY.MEANS...					48.3	30.6
MAXIMUM	51.9	32.1	46.7	32.4	46.4	32.1
MINIMUM	46.8	26.0	41.2	31.0	42.5	30.8
STD.DEV.	1.30	1.55	1.36	.30	.87	.40

PINE ISLAND 50 58 33 N 127 43 35 W

	JANUARY		FEBRUARY		MARCH	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	45.0	30.6	45.4	31.1	* 44.1	* 31.2
2	45.1	31.4	45.6	31.5	44.2	31.2
3	45.0	31.2	44.0	31.4	44.2	31.1
4	45.1	31.6	43.8	31.4	44.6	31.4
5	44.9	31.2	44.4	31.2	44.4	31.4
6	44.9	31.2	44.2	31.2	44.6	31.4
7	* 44.9	* 31.2	44.2	31.2	44.2	31.2
8	44.9	31.2	44.0	31.2	44.2	31.2
9	44.9	31.2	44.2	31.4	44.4	31.4
10	* 0.0	* 0.0	44.4	31.2	44.6	31.4
11	* 0.0	* 0.0	44.4	31.2	44.8	31.4
12	* 0.0	* 0.0	43.8	31.2	44.0	31.2
13	45.1	31.6	* 43.8	* 31.2	44.0	31.2
14	45.2	31.0	* 43.9	* 31.3	44.2	31.1
15	* 45.2	* 31.3	43.9	31.4	* 0.0	* 0.0
16	45.3	31.6	43.8	31.4	* 0.0	* 0.0
17	45.2	31.2	44.0	31.5	* 0.0	* 0.0
18	44.8	31.2	44.2	31.5	* 0.0	* 0.0
19	44.8	31.2	* 44.3	* 31.4	* 0.0	* 0.0
20	44.6	31.5	44.4	31.4	44.8	31.1
21	44.6	31.5	44.0	31.1	44.9	31.1
22	* 44.6	* 31.5	44.4	31.2	44.8	31.1
23	* 44.6	* 31.5	43.6	31.2	44.6	31.4
24	44.6	31.5	44.0	31.2	44.6	31.4
25	43.8	31.0	44.2	31.2	44.9	31.1
26	44.9	31.2	* 44.1	* 31.2	44.6	31.1
27	44.8	31.2	44.0	31.1	44.6	31.4
28	45.2	31.6	44.0	31.1	* 44.6	* 31.4
29	45.2	30.7	0.0	0.0	* 44.7	* 31.4
30	45.6	30.7	0.0	0.0	44.8	31.4
31	45.6	31.0	0.0	0.0	44.7	31.4
MEANS	45.0	31.2	44.2	31.3	44.5	31.3
OBSVNS.	24	24	24	24	23	23
MAXIMUM	45.6	31.6	45.6	31.5	44.9	31.4
MINIMUM	43.8	30.6	43.6	31.1	44.0	31.1
STD.DEV.	.36	.29	.46	.14	.28	.14

PINE ISLAND 50 58 33 N 127 43 35 W

	APRIL		MAY		JUNE	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	* 44.9	* 31.4	46.4	31.6	47.4	32.3
2	* 45.2	* 31.5	46.3	31.6	47.0	32.0
3	45.5	31.6	46.7	31.6	47.4	32.0
4	45.0	31.6	46.3	31.8	47.6	32.0
5	45.0	31.6	45.8	32.0	47.6	32.0
6	45.8	31.8	46.4	31.9	47.8	32.1
7	45.8	31.8	* 46.2	* 31.9	47.2	31.9
8	45.8	31.8	* 45.9	* 32.0	* 47.7	* 31.8
9	* 45.6	31.8	45.7	32.0	48.2	31.8
10	* 45.4	31.8	46.2	31.9	48.2	31.9
11	45.2	31.8	46.4	31.8	48.2	31.9
12	45.2	31.8	46.2	31.9	48.0	31.8
13	45.6	31.8	47.2	31.6	48.2	31.8
14	45.8	31.9	47.3	31.8	48.0	31.8
15	45.6	31.8	46.6	31.5	48.0	31.8
16	45.7	31.6	48.4	32.0	48.2	31.9
17	45.6	31.6	47.9	31.6	48.0	32.0
18	45.7	31.9	47.6	31.5	48.0	32.0
19	45.8	31.9	47.5	31.8	48.5	32.3
20	45.6	31.8	47.5	31.8	48.4	32.3
21	45.7	31.9	* 47.6	* 31.7	* 47.4	* 32.3
22	* 46.0	* 31.7	47.8	31.6	* 46.4	* 32.3
23	46.4	31.5	47.8	31.6	45.5	32.3
24	46.2	31.6	47.3	31.8	48.4	32.1
25	46.0	31.9	47.0	31.8	48.4	32.0
26	46.2	31.8	* 47.0	* 31.8	47.8	31.6
27	45.6	31.9	* 47.0	* 31.8	48.5	31.9
28	45.7	31.6	47.0	31.8	48.2	31.9
29	46.0	31.5	48.4	31.8	48.3	32.0
30	46.3	31.5	48.4	31.8	48.4	32.4
31	0.0	0.0	48.2	31.8	0.0	0.0
MEANS	45.7	31.7	47.1	31.8	47.9	32.0
OBSVNS.	25	27	26	26	27	27
MAXIMUM	46.4	31.9	48.4	32.0	48.5	32.4
MINIMUM	45.0	31.5	45.7	31.5	45.5	31.6
STD.DEV.	.36	.14	.82	.15	.63	.19

PINE ISLAND 50 58 33 N 127 43 35 W

	JULY		AUGUST		SEPTEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	* 48.5	* 32.0	49.8	31.6	47.0	32.3
2	48.6	31.6	49.9	31.6	* 47.4	* 32.2
3	48.2	32.0	50.0	31.9	47.9	32.1
4	48.0	32.3	50.0	31.9	48.0	32.1
5	48.2	32.3	50.0	31.9	48.0	32.3
6	* 48.3	* 32.2	49.2	31.9	48.3	32.0
7	* 48.4	* 32.1	49.0	32.0	48.0	31.8
8	* 48.5	* 31.9	49.2	31.9	48.5	31.6
9	48.6	31.8	49.2	32.0	* 48.3	* 31.7
10	48.4	31.8	50.2	31.8	* 48.1	* 31.9
11	49.0	31.9	49.0	31.9	48.0	32.0
12	48.0	32.0	49.8	31.9	47.8	32.0
13	48.2	32.0	50.2	31.8	49.0	32.1
14	48.6	31.6	50.4	31.9	49.0	32.1
15	49.0	31.9	50.0	32.0	48.5	32.3
16	48.4	32.5	50.2	31.9	49.0	32.3
17	48.6	32.5	50.0	32.3	48.5	32.4
18	48.4	32.5	49.4	32.0	48.5	32.4
19	* 48.6	* 32.3	* 49.7	* 32.4	48.5	32.5
20	48.8	32.1	50.0	32.7	49.5	32.5
21	48.8	32.1	49.0	32.7	51.0	32.1
22	49.0	31.5	49.0	31.5	51.2	32.0
23	49.0	31.5	49.9	31.6	50.9	32.0
24	47.7	32.0	48.0	31.4	51.8	32.1
25	47.8	32.0	49.2	31.5	49.5	31.9
26	48.0	32.0	48.5	31.6	48.5	31.1
27	* 48.5	* 32.0	47.9	31.5	50.6	31.9
28	49.0	31.9	* 47.7	* 31.9	50.7	32.1
29	48.8	32.0	47.5	32.3	50.0	31.5
30	48.9	32.0	47.5	32.3	49.0	31.6
31	49.8	31.9	47.8	32.5	0.0	0.0
MEANS	48.6	32.0	49.3	31.9	49.1	32.0
OBSVNS.	25	25	29	29	27	27
MAXIMUM	49.8	32.5	50.4	32.7	51.8	32.5
MINIMUM	47.7	31.5	47.5	31.4	47.0	31.1
STD.DEV.	.48	.28	.87	.34	1.24	.32

PINE ISLAND 50 58 33 N 127 43 35 W

	OCTOBER		NOVEMBER		DECEMBER	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	49.0	31.6	48.8	31.9	45.2	31.6
2	48.2	32.0	48.2	32.1	44.6	31.6
3	48.5	32.0	47.5	31.6	46.0	31.9
4	49.0	32.3	46.2	31.8	45.6	31.6
5	48.5	32.1	45.8	31.8	45.0	31.6
6	48.9	32.7	45.5	31.5	45.8	31.6
7	48.5	32.5	* 45.8	* 31.6	45.8	31.4
8	48.2	32.3	46.0	31.6	45.5	31.4
9	47.8	32.5	45.8	31.9	46.0	31.6
10	47.7	32.3	45.6	31.6	45.5	31.6
11	47.5	32.3	46.0	31.6	45.8	31.9
12	47.5	31.9	45.8	31.9	45.5	31.6
13	47.2	32.4	46.2	31.9	45.8	31.6
14	48.0	33.0	46.5	32.0	46.3	31.9
15	47.2	32.4	46.0	31.9	46.6	30.6
16	48.5	32.5	46.5	32.1	45.8	31.1
17	48.0	32.5	46.0	31.9	46.5	31.4
18	47.8	32.9	46.2	31.9	47.0	31.4
19	48.5	32.7	* 45.7	* 32.0	45.5	31.6
20	48.8	32.4	45.2	32.0	46.2	31.1
21	49.2	32.3	45.6	31.6	46.0	31.4
22	47.5	* 32.2	45.5	31.6	46.2	31.4
23	48.7	32.0	45.0	31.5	46.8	31.6
24	49.2	32.5	46.0	31.9	47.2	30.8
25	49.0	31.9	45.5	31.6	46.0	30.8
26	* 48.2	* 31.9	45.0	31.5	46.8	31.6
27	47.5	31.9	45.5	31.6	46.0	31.2
28	48.5	32.0	45.8	31.9	46.0	31.1
29	48.7	32.7	46.2	31.6	46.0	31.1
30	48.0	32.0	45.5	31.6	45.5	31.1
31	48.3	32.5	0.0	0.0	46.0	30.8
MEANS	48.3	32.3	46.0	31.8	46.0	31.4
OBSVNS.	30	29	28	28	31	31
YRLY.MEANS....................................					46.9	31.7
MAXIMUM	49.2	33.0	48.8	32.1	47.2	31.9
MINIMUM	47.2	31.6	45.0	31.5	44.6	30.6
STD.DEV.	.60	.33	.86	.19	.57	.34

KAINS ISLAND 50 26 39 N 128 01 47 W

	JANUARY		FEBRUARY		MARCH	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	45.3	29.8	44.0	27.1	45.5	28.4
2	44.3	28.2	42.9	26.3	45.5	29.4
3	43.3	28.8	43.5	27.7	45.4	29.4
4	43.2	28.5	43.0	27.7	45.6	29.3
5	42.6	29.4	43.0	28.8	45.2	29.3
6	42.1	29.0	43.3	29.0	46.2	29.8
7	42.9	29.8	41.6	28.6	45.5	29.9
8	41.8	29.8	42.6	28.8	46.0	29.8
9	42.3	30.0	43.2	29.0	46.2	30.3
10	41.8	29.9	42.5	29.3	46.0	30.3
11	44.4	30.0	43.0	29.3	45.5	30.2
12	45.4	30.2	42.3	29.0	45.5	30.2
13	44.8	30.0	42.5	29.3	45.4	30.2
14	45.0	29.0	44.2	29.4	45.8	30.4
15	44.7	28.9	44.2	29.5	45.7	29.4
16	44.8	29.1	45.0	29.8	45.5	29.8
17	44.7	29.1	45.0	30.3	44.5	29.3
18	43.9	26.4	44.9	29.3	44.0	30.3
19	44.8	28.5	44.6	29.5	45.8	29.5
20	45.0	29.7	44.6	29.3	45.0	29.1
21	44.9	28.4	45.5	29.9	45.5	29.3
22	45.0	29.3	45.0	29.5	45.2	29.3
23	45.5	28.4	45.5	29.9	46.5	30.0
24	44.1	27.6	45.4	29.7	46.2	29.8
25	43.9	26.4	45.9	30.0	46.6	29.9
26	42.4	27.6	46.3	30.0	45.5	30.0
27	43.2	28.2	46.0	30.7	45.8	29.9
28	43.7	27.8	44.4	28.9	45.5	30.0
29	43.2	27.2	0.0	0.0	45.2	29.8
30	44.0	28.8	0.0	0.0	46.1	30.4
31	43.5	29.0	0.0	0.0	46.4	29.9
MEANS	43.9	28.8	44.1	29.1	45.6	29.8
OBSVNS.	31	31	28	28	31	31
MAXIMUM	45.5	30.2	46.3	30.7	46.6	30.4
MINIMUM	41.8	26.4	41.6	26.3	44.0	28.4
STD.DEV.	1.11	1.02	1.29	.96	.55	.46

KAINS ISLAND 50 26 39 N 128 01 47 W

	APRIL		MAY		JUNE	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	47.0	29.4	48.8	31.1	50.3	31.2
2	46.6	30.4	49.6	30.7	49.9	31.6
3	46.7	30.6	49.1	31.0	49.8	31.8
4	46.7	30.3	49.9	31.4	49.2	31.1
5	46.4	28.8	49.7	31.2	50.3	31.6
6	46.8	29.7	48.4	31.8	49.2	31.4
7	47.1	29.9	48.4	31.2	50.4	31.4
8	47.4	29.7	49.1	31.4	49.3	31.5
9	48.3	30.0	49.4	29.1	51.1	31.2
10	49.1	30.0	50.1	29.8	51.8	30.7
11	48.2	30.2	50.1	30.2	49.8	31.2
12	47.5	30.4	51.2	30.2	50.4	31.4
13	47.3	30.6	50.4	30.6	50.3	31.2
14	47.6	30.8	50.1	31.0	52.1	31.0
15	47.4	30.6	50.8	31.1	50.9	31.1
16	47.7	30.8	50.5	31.1	51.2	31.5
17	47.3	30.8	51.1	31.2	52.3	30.3
18	47.5	30.7	51.0	30.8	51.6	31.4
19	47.6	30.2	50.7	31.1	52.4	30.3
20	48.0	30.3	50.6	31.5	52.3	30.2
21	48.1	30.6	51.4	31.2	52.2	31.2
22	48.1	30.4	50.0	31.1	52.3	31.1
23	48.4	30.3	50.5	31.2	52.8	31.0
24	49.2	29.9	51.7	31.2	51.8	31.5
25	48.2	30.3	52.1	29.3	52.8	30.6
26	47.8	31.2	50.4	29.7	53.6	30.6
27	48.4	30.6	53.4	30.7	54.2	31.9
28	48.7	30.7	51.8	29.5	54.0	31.8
29	49.2	30.3	51.5	30.2	52.8	31.9
30	48.7	30.4	50.4	30.4	51.2	31.4
31	0.0	0.0	49.7	30.6	0.0	0.0
MEANS	47.8	30.3	50.4	30.7	51.4	31.2
OBSVNS.	30	30	31	31	30	30
MAXIMUM	49.2	31.2	53.4	31.8	54.2	31.9
MINIMUM	46.4	28.8	48.4	29.1	49.2	30.2
STD.DEV.	.78	.48	1.11	.68	1.41	.46

KAINS ISLAND 50 26 39 N 128 01 47 W

	JULY		AUGUST		SEPTEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	50.8	31.9	55.2	32.3	53.4	33.0
2	51.2	31.9	54.8	31.9	52.4	32.8
3	51.3	31.8	55.2	32.0	53.7	32.9
4	50.8	31.8	55.1	32.5	53.2	32.5
5	51.8	31.6	53.7	32.3	55.1	33.0
6	52.4	31.8	53.4	32.4	55.3	32.5
7	52.9	31.5	53.0	32.5	55.5	32.8
8	53.6	31.8	54.6	32.5	55.4	32.5
9	53.7	31.8	55.1	32.8	56.5	32.4
10	52.9	32.0	54.1	32.3	57.2	32.5
11	53.4	31.6	52.9	32.1	57.1	* 32.8
12	54.2	31.6	54.7	32.4	57.1	33.0
13	54.8	31.4	53.3	32.8	55.4	32.4
14	55.2	31.5	52.3	32.5	55.5	32.1
15	53.8	31.9	50.8	32.5	56.1	32.8
16	52.5	31.8	51.2	32.7	56.4	32.5
17	51.4	32.1	51.2	32.5	56.6	32.4
18	53.4	32.4	52.6	32.9	56.4	32.1
19	54.4	32.3	53.6	* 32.9	56.6	32.3
20	53.3	32.3	54.7	32.9	56.6	32.3
21	52.8	32.3	54.6	* 32.9	56.5	32.1
22	52.8	31.9	54.5	32.9	56.7	32.1
23	53.5	32.0	55.7	32.9	57.6	32.5
24	52.2	31.9	55.1	32.9	56.7	32.1
25	53.7	32.0	55.2	32.8	55.1	32.3
26	51.2	31.1	55.7	* 32.6	55.1	32.3
27	52.6	31.4	54.3	32.5	55.9	31.8
28	53.2	31.9	53.8	32.9	55.2	32.1
29	55.7	32.0	54.1	32.7	54.9	30.7
30	54.8	32.1	54.0	32.8	54.7	30.4
31	55.8	32.0	53.8	32.5	0.0	0.0
MEANS	53.1	31.9	53.9	32.6	55.7	32.3
OBSVNS.	31	31	31	28	30	29
MAXIMUM	55.8	32.4	55.7	32.9	57.6	33.0
MINIMUM	50.8	31.1	50.8	31.9	52.4	30.4
STD.DEV.	1.38	.29	1.30	.29	1.27	.58

KAINS ISLAND 50 26 39 N 128 01 47 W

	OCTOBER		NOVEMBER		DECEMBER	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	54.3	30.6	48.7	29.4	45.7	29.3
2	53.6	31.2	47.0	29.5	46.2	30.3
3	54.3	31.8	46.8	29.7	46.6	30.4
4	53.8	31.9	46.6	30.2	45.5	28.5
5	53.6	31.1	46.9	30.3	* 45.4	* 28.6
6	52.5	30.4	47.2	30.0	45.4	28.8
7	52.7	31.0	46.8	30.4	45.4	28.1
8	52.3	31.2	45.2	29.7	45.8	28.5
9	52.9	31.5	46.4	30.2	46.2	29.7
10	53.3	31.9	47.0	30.6	45.9	29.4
11	53.3	31.9	48.1	30.6	47.1	30.3
12	52.7	32.0	47.7	30.8	45.2	29.3
13	52.2	29.8	46.7	30.4	* 45.7	* 29.5
14	52.4	30.6	47.0	30.6	46.2	29.7
15	51.3	31.5	46.0	30.3	* 45.7	* 29.1
16	51.4	31.2	46.2	30.4	45.2	28.5
17	52.1	31.6	46.5	30.2	43.7	24.0
18	51.5	30.8	45.5	30.2	44.8	26.7
19	51.5	31.4	* 0.0	* 30.2	46.2	28.6
20	50.8	30.4	* 0.0	* 30.2	45.8	28.1
21	51.1	30.8	* 0.0	* 30.3	45.4	27.7
22	50.7	29.8	44.9	30.3	46.3	28.2
23	50.9	29.7	45.2	30.7	46.1	26.8
24	50.8	29.9	45.8	30.6	46.0	29.0
25	50.8	30.3	46.3	30.6	45.6	28.4
26	51.2	30.2	46.0	30.6	44.9	27.8
27	51.4	30.3	46.9	31.0	44.1	28.4
28	51.2	30.3	45.8	30.3	* 44.0	* 28.3
29	51.4	31.0	44.7	29.5	43.8	28.2
30	50.5	28.6	45.1	29.5	43.8	28.6
31	49.4	28.2	0.0	0.0	42.3	28.6
MEANS	52.0	30.7	46.4	30.2	45.4	28.5
OBSVNS.	31	31	27	27	27	27
YRLY.MEANS....................................					49.2	30.5
MAXIMUM	54.3	32.0	48.7	31.0	47.1	30.4
MINIMUM	49.4	28.2	44.7	29.4	42.3	24.0
STD.DEV.	1.23	.93	.96	.44	1.06	1.29

AMPHITRITE POINT 48 55 16 N 125 32 17 W

	JANUARY		FEBRUARY		MARCH	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	* 46.2	* 26.4	* 45.4	* 28.0	46.7	29.8
2	46.0	26.5	45.3	27.8	46.4	29.7
3	44.8	25.2	44.3	27.1	46.9	29.7
4	43.7	26.0	44.4	28.5	47.3	28.2
5	42.7	25.6	43.7	27.3	47.2	27.1
6	42.5	26.7	43.0	26.7	48.2	28.9
7	41.6	26.3	43.1	26.5	48.1	28.1
8	41.3	26.3	44.6	27.6	47.9	28.5
9	42.5	28.1	45.0	28.9	47.8	28.6
10	43.4	29.0	44.9	28.9	47.8	29.4
11	44.2	29.0	44.6	29.1	48.0	29.3
12	44.7	29.3	44.7	29.0	47.4	27.1
13	44.9	28.5	44.7	29.0	47.2	29.5
14	45.1	28.4	44.8	28.9	47.5	29.5
15	45.2	28.5	45.1	29.0	47.4	29.8
16	45.3	29.5	45.4	29.9	46.8	28.0
17	45.6	29.9	45.4	30.4	47.0	28.0
18	44.8	24.4	45.6	29.5	46.7	28.9
19	46.3	30.0	45.8	29.7	46.9	29.9
20	* 46.0	* 28.9	46.0	29.7	47.2	28.8
21	45.7	27.8	46.1	29.7	47.3	29.1
22	45.4	27.3	45.8	29.4	47.3	29.3
23	45.4	27.2	46.3	29.3	47.0	30.0
24	45.4	27.3	46.2	29.8	47.2	29.8
25	45.6	29.0	46.3	29.8	47.4	29.9
26	* 44.7	* 28.6	46.5	29.8	47.6	29.8
27	43.8	28.2	46.7	30.3	46.9	30.0
28	* 0.0	* 0.0	46.3	28.4	47.0	30.0
29	* 0.0	* 0.0	0.0	0.0	47.2	29.9
30	* 0.0	* 0.0	0.0	0.0	46.9	28.4
31	45.4	28.1	0.0	0.0	47.1	29.4
MEANS	44.5	27.7	45.2	28.9	47.3	29.1
OBSVNS.	25	25	27	27	31	31
MAXIMUM	46.3	30.0	46.7	30.4	48.2	30.0
MINIMUM	41.3	24.4	43.0	26.5	46.4	27.1
STD.DEV.	1.40	1.51	.99	1.08	.44	.84

AMPHITRITE POINT 48 55 16 N 125 32 17 W

	APRIL		MAY		JUNE	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	47.3	28.6	48.8	31.4	50.3	32.1
2	48.3	29.3	49.3	31.6	51.6	31.4
3	48.1	29.4	50.4	30.7	52.8	31.2
4	48.4	29.9	51.6	31.2	53.1	31.2
5	48.6	30.7	51.1	31.4	51.3	31.9
6	49.2	30.4	48.6	31.6	50.2	27.3
7	49.3	30.6	49.6	29.9	51.1	28.6
8	49.2	30.6	49.1	29.8	50.8	29.3
9	49.8	30.2	49.8	31.2	51.3	28.8
10	48.9	30.4	50.8	30.2	49.6	31.4
11	48.7	31.0	50.3	29.9	53.3	29.5
12	48.3	31.0	51.3	30.2	53.0	27.6
13	48.8	30.7	53.1	29.8	52.8	30.8
14	48.9	30.7	53.6	29.7	53.1	27.8
15	49.1	30.7	53.4	30.7	52.8	28.1
16	49.6	29.0	53.0	30.8	53.2	27.3
17	48.8	31.4	52.3	31.6	53.7	27.8
18	48.5	29.5	50.4	32.0	53.8	28.1
19	49.6	29.9	49.9	32.0	53.4	29.4
20	49.4	29.7	50.1	32.4	56.8	28.4
21	49.3	28.9	50.3	31.0	56.8	29.4
22	49.2	31.2	50.2	30.3	* 55.8	* 29.2
23	49.2	31.2	49.9	29.3	54.9	29.1
24	49.0	31.2	50.0	31.1	53.2	29.3
25	50.6	30.6	50.5	30.7	53.7	29.8
26	49.8	29.3	50.2	30.8	54.3	30.4
27	48.4	31.6	50.7	30.8	52.3	31.2
28	47.9	31.9	51.4	27.1	52.2	31.5
29	48.4	31.9	53.9	28.9	52.7	31.4
30	48.7	31.5	50.8	31.9	52.3	31.2
31	0.0	0.0	50.8	31.8	0.0	0.0
MEANS	48.9	30.4	50.8	30.7	52.8	29.7
OBSVNS.	30	30	31	31	29	29
MAXIMUM	50.6	31.9	53.9	32.4	56.8	32.1
MINIMUM	47.3	28.6	48.6	27.1	49.6	27.3
STD.DEV.	.66	.91	1.40	1.09	1.68	1.54

AMPHITRITE POINT 48 55 16 N 125 32 17 W

	JULY		AUGUST		SEPTEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	52.3	31.1	55.7	31.4	55.7	31.9
2	53.1	31.4	56.5	31.8	54.6	31.6
3	53.2	31.5	55.3	31.8	54.3	31.6
4	50.9	31.1	54.5	31.5	53.8	31.9
5	52.7	31.2	54.6	31.5	54.9	31.8
6	52.4	31.0	54.3	31.5	54.8	31.2
7	54.1	29.7	53.3	31.6	52.2	31.5
8	54.2	29.8	54.4	31.4	53.4	31.8
9	54.2	29.1	54.0	31.6	53.4	31.9
10	54.8	30.0	54.3	31.5	55.0	31.8
11	53.1	30.7	53.7	31.6	56.9	31.4
12	53.3	30.8	55.0	31.6	55.3	31.5
13	53.7	31.5	55.8	31.6	55.6	31.5
14	53.4	31.5	56.0	31.6	55.0	31.6
15	54.6	31.5	55.8	31.6	55.2	31.6
16	55.6	31.8	54.2	31.6	57.0	31.8
17	54.3	31.9	54.4	32.0	56.9	31.5
18	57.8	31.0	55.6	32.0	56.1	31.5
19	55.8	31.5	55.3	31.9	55.0	31.4
20	54.7	31.5	57.6	31.9	54.1	29.9
21	54.9	31.6	55.6	31.8	53.7	30.6
22	53.7	31.9	56.2	31.9	54.1	30.6
23	55.4	32.0	55.3	31.8	54.3	31.1
24	54.6	31.6	55.7	31.6	54.9	31.0
25	56.1	31.1	56.6	31.6	52.7	31.5
26	55.7	31.5	55.9	31.5	53.4	30.7
27	56.9	31.8	55.2	31.6	53.6	29.8
28	55.3	31.6	50.3	30.0	54.2	30.0
29	54.3	31.4	55.3	31.0	54.6	30.3
30	55.0	31.5	56.4	31.4	54.4	30.6
31	57.6	31.1	55.7	31.8	0.0	0.0
MEANS	54.4	31.2	55.1	31.6	54.6	31.2
OBSVNS.	31	31	31	31	30	30
MAXIMUM	57.8	32.0	57.6	32.0	57.0	31.9
MINIMUM	50.9	29.1	50.3	30.0	52.2	29.8
STD.DEV.	1.53	.69	1.30	.36	1.16	.63

AMPHITRITE POINT 48 55 16 N 125 32 17 W

	OCTOBER		NOVEMBER		DECEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	54.6	30.4	50.2	26.7	48.3	29.1
2	55.0	30.3	48.9	25.5	48.8	29.4
3	55.2	30.6	47.6	19.5	49.6	30.3
4	54.6	30.4	* 47.4	* 23.2	49.1	30.2
5	55.1	30.6	47.3	26.9	47.4	26.9
6	54.0	30.8	47.8	28.9	48.9	28.8
7	53.3	31.1	48.6	28.4	48.8	28.4
8	52.7	29.7	46.7	27.8	47.7	26.7
9	52.7	30.8	48.3	29.3	46.7	26.5
10	53.1	29.3	48.7	30.4	47.1	27.1
11	52.7	29.7	49.1	28.9	* 47.5	* 27.4
12	51.2	30.4	49.4	30.0	* 47.9	* 27.7
13	51.3	30.0	48.9	29.9	48.3	28.0
14	51.7	30.3	48.8	29.0	48.7	28.1
15	51.3	30.0	49.5	29.5	* 48.4	* 28.2
16	51.8	30.8	49.9	29.4	48.2	28.2
17	51.7	29.5	48.4	28.9	48.1	28.9
18	51.2	25.4	47.3	28.0	47.1	24.8
19	51.0	29.1	45.6	28.1	47.8	25.9
20	51.0	27.6	* 47.4	* 28.9	49.3	27.8
21	51.1	27.8	49.0	29.9	48.3	27.3
22	50.9	28.8	46.6	27.1	48.0	26.5
23	50.8	29.0	47.8	29.0	48.3	27.1
24	51.0	29.5	48.6	29.8	48.6	27.7
25	51.8	30.4	49.7	30.3	48.9	28.9
26	51.3	28.0	49.2	30.2	47.4	26.4
27	52.0	29.5	48.5	26.9	46.2	26.0
28	51.9	29.1	49.4	30.0	47.3	27.1
29	51.7	28.9	48.4	28.5	47.5	28.2
30	51.8	30.0	47.8	28.1	46.4	27.1
31	51.8	29.1	0.0	0.0	45.8	27.6
MEANS	52.3	29.6	48.4	28.4	47.9	27.7
OBSVNS.	31	31	28	28	28	28
YRLY.MEANS..					50.4	29.7
MAXIMUM	55.2	31.1	50.2	30.4	49.6	30.3
MINIMUM	50.8	25.4	45.6	19.5	45.8	24.8
STD.DEV.	1.39	1.19	1.07	2.15	.96	1.30

SHERINGHAM POINT   48 22 40 N   123 55 10 W

	JANUARY			FEBRUARY			MARCH		1973
DATE	TEMP		SAL	TEMP		SAL	TEMP		SAL
1	45.5	*	0.0	44.8	*	0.0	46.6	*	0.0
2	45.1	*	0.0	44.9	*	0.0	46.7	*	0.0
3	44.0	*	0.0	44.9	*	0.0	46.7	*	0.0
4	44.3	*	0.0	45.0	*	0.0	* 46.6	*	0.0
5	43.3	*	0.0	44.9	*	0.0	46.6	*	0.0
6	43.8	*	0.0	44.8	*	0.0	46.7	*	0.0
7	43.5	*	0.0	44.9	*	0.0	46.7	*	0.0
8	43.7	*	0.0	* 44.9	*	0.0	46.8	*	0.0
9	43.7	*	0.0	44.9	*	0.0	46.8	*	0.0
10	43.5	*	0.0	45.0	*	0.0	46.8	*	0.0
11	43.8	*	0.0	45.0	*	0.0	46.8	*	0.0
12	44.1	*	0.0	* 44.9	*	0.0	46.7	*	0.0
13	44.2	*	0.0	44.8	*	0.0	46.2	*	0.0
14	44.5	*	0.0	45.1	*	0.0	46.4	*	0.0
15	45.2	*	0.0	45.1	*	0.0	46.6	*	0.0
16	44.5	*	0.0	45.2	*	0.0	46.6	*	0.0
17	44.8	*	0.0	45.4	*	0.0	46.6	*	0.0
18	44.8	*	0.0	46.3	*	0.0	46.7	*	0.0
19	44.7	*	0.0	46.0	*	0.0	46.9	*	0.0
20	45.4	*	0.0	46.2	*	0.0	47.1	*	0.0
21	45.3	*	0.0	46.2	*	0.0	47.2	*	0.0
22	45.3	*	0.0	46.3	*	0.0	47.4	*	0.0
23	45.3	*	0.0	46.4	*	0.0	47.5	*	0.0
24	45.2	*	0.0	46.3	*	0.0	47.8	*	0.0
25	45.2	*	0.0	46.1	*	0.0	47.8	*	0.0
26	45.0	*	0.0	46.2	*	0.0	47.7	*	0.0
27	44.6	*	0.0	46.7	*	0.0	47.7	*	0.0
28	44.8	*	0.0	46.6	*	0.0	47.8	*	0.0
29	44.9	*	0.0	0.0		0.0	47.7	*	0.0
30	45.2	*	0.0	0.0		0.0	47.8	*	0.0
31	45.2	*	0.0	0.0		0.0	47.8	*	0.0
MEANS	44.6		0.0	45.5		0.0	47.0		0.0
OBSVNS.	31		0	26		0	30		0
MAXIMUM	45.5		0.0	46.7		0.0	47.8		0.0
MINIMUM	43.3		0.0	44.8		0.0	46.2		0.0
STD.DEV.	.66		0.00	.69		0.00	.51		0.00

SHERINGHAM POINT 48 22 40 N 123 55 10 W

	APRIL		MAY		JUNE	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	47.2	* 0.0	48.2	* 0.0	48.8	* 0.0
2	* 47.4	* 0.0	48.1	* 0.0	48.6	* 0.0
3	47.6	* 0.0	48.2	* 0.0	48.7	* 0.0
4	47.6	* 0.0	48.2	* 0.0	48.6	* 0.0
5	47.6	* 0.0	48.2	* 0.0	48.6	* 0.0
6	47.7	* 0.0	48.1	* 0.0	48.7	* 0.0
7	47.7	* 0.0	48.2	* 0.0	48.7	* 0.0
8	47.7	* 0.0	48.0	* 0.0	48.7	* 0.0
9	47.7	* 0.0	48.2	* 0.0	48.3	* 0.0
10	47.8	* 0.0	48.2	* 0.0	49.8	* 0.0
11	47.8	* 0.0	48.3	* 0.0	* 49.4	* 0.0
12	47.2	* 0.0	47.7	* 0.0	48.9	* 0.0
13	47.8	* 0.0	48.1	* 0.0	49.3	* 0.0
14	48.0	* 0.0	48.1	* 0.0	49.2	* 0.0
15	47.8	* 0.0	49.5	* 0.0	49.3	* 0.0
16	47.8	* 0.0	48.8	* 0.0	49.3	* 0.0
17	47.7	* 0.0	48.7	* 0.0	49.2	* 0.0
18	46.8	* 0.0	48.3	* 0.0	49.0	* 0.0
19	47.5	* 0.0	48.1	* 0.0	49.1	* 0.0
20	47.8	* 0.0	48.4	* 0.0	49.4	* 0.0
21	47.8	* 0.0	48.5	* 0.0	50.2	* 0.0
22	47.8	* 0.0	48.5	* 0.0	50.6	* 0.0
23	47.5	* 0.0	48.7	* 0.0	50.2	* 0.0
24	47.9	* 0.0	48.6	* 0.0	50.1	* 0.0
25	47.9	* 0.0	48.6	* 0.0	50.1	* 0.0
26	48.2	* 0.0	48.7	* 0.0	50.2	* 0.0
27	48.1	* 0.0	48.7	* 0.0	53.5	* 0.0
28	48.2	* 0.0	48.4	* 0.0	52.4	* 0.0
29	48.1	* 0.0	48.5	* 0.0	50.7	* 0.0
30	48.2	* 0.0	48.5	* 0.0	50.3	* 0.0
31	0.0	0.0	48.6	* 0.0	0.0	0.0
MEANS	47.7	0.0	48.4	0.0	49.6	0.0
OBSVNS.	29	0	31	0	29	0
MAXIMUM	48.2	0.0	49.5	0.0	53.5	0.0
MINIMUM	46.8	0.0	47.7	0.0	48.3	0.0
STD.DEV.	.31	0.00	.33	0.00	1.16	0.00

SHERINGHAM POINT 48 22 40 N 123 55 10 W

	JULY		AUGUST		SEPTEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	51.6	* 0.0	50.1	* 0.0	49.3	* 0.0
2	51.4	* 0.0	50.4	* 0.0	49.4	* 0.0
3	51.4	* 0.0	50.1	* 0.0	50.3	* 0.0
4	51.2	* 0.0	51.0	* 0.0	50.8	* 0.0
5	51.4	* 0.0	50.1	* 0.0	51.2	* 0.0
6	51.6	* 0.0	52.4	* 0.0	51.0	* 0.0
7	52.1	* 0.0	51.4	* 0.0	51.2	* 0.0
8	52.2	* 0.0	52.0	* 0.0	51.4	* 0.0
9	* 52.2	* 0.0	52.1	* 0.0	51.3	* 0.0
10	52.2	* 0.0	52.1	* 0.0	51.5	* 0.0
11	52.1	* 0.0	52.0	* 0.0	51.1	* 0.0
12	52.1	* 0.0	53.0	* 0.0	51.2	* 0.0
13	52.6	* 0.0	52.7	* 0.0	51.2	* 0.0
14	52.7	* 0.0	51.2	* 0.0	51.2	* 0.0
15	50.8	* 0.0	51.2	* 0.0	51.1	* 0.0
16	52.0	* 0.0	50.3	* 0.0	51.3	* 0.0
17	52.3	* 0.0	50.7	* 0.0	51.3	* 0.0
18	51.8	* 0.0	51.7	* 0.0	51.2	* 0.0
19	51.4	* 0.0	51.3	* 0.0	51.3	* 0.0
20	51.4	* 0.0	51.4	* 0.0	51.2	* 0.0
21	51.2	* 0.0	51.5	* 0.0	50.9	* 0.0
22	50.4	* 0.0	51.2	* 0.0	50.9	* 0.0
23	50.5	* 0.0	52.3	* 0.0	50.8	* 0.0
24	52.0	* 0.0	51.2	* 0.0	50.9	* 0.0
25	52.3	* 0.0	51.7	* 0.0	50.8	* 0.0
26	52.5	* 0.0	51.7	* 0.0	* 50.3	* 0.0
27	51.3	* 0.0	51.6	* 0.0	49.8	* 0.0
28	51.5	* 0.0	51.4	* 0.0	49.3	* 0.0
29	51.5	* 0.0	49.8	* 0.0	49.7	* 0.0
30	51.0	* 0.0	49.2	* 0.0	49.3	* 0.0
31	50.4	* 0.0	49.8	* 0.0	0.0	0.0
MEANS	51.6	0.0	51.2	0.0	50.8	0.0
OBSVNS.	30	0	31	0	29	0
MAXIMUM	52.7	0.0	53.0	0.0	51.5	0.0
MINIMUM	50.4	0.0	49.2	0.0	49.3	0.0
STD.DEV.	.63	0.00	.92	0.00	.72	0.00

SHERINGHAM POINT 48 22 40 N 123 55 10 W

	OCTOBER		NOVEMBER		DECEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	49.4	* 0.0	48.8	* 0.0	46.8	* 0.0
2	49.4	* 0.0	48.2	* 0.0	* 46.8	* 0.0
3	49.9	* 0.0	48.3	* 0.0	46.7	* 0.0
4	49.8	* 0.0	48.3	* 0.0	46.6	* 0.0
5	50.6	* 0.0	46.6	* 0.0	46.6	* 0.0
6	49.8	* 0.0	47.8	* 0.0	46.7	* 0.0
7	49.2	* 0.0	48.9	* 0.0	46.5	* 0.0
8	50.2	* 0.0	48.6	* 0.0	46.4	* 0.0
9	49.8	* 0.0	48.2	* 0.0	46.4	* 0.0
10	49.8	* 0.0	48.2	* 0.0	46.4	* 0.0
11	49.7	* 0.0	47.7	* 0.0	46.5	* 0.0
12	49.7	* 0.0	47.9	* 0.0	46.5	* 0.0
13	48.3	* 0.0	47.6	* 0.0	46.5	* 0.0
14	48.4	* 0.0	47.6	* 0.0	46.4	* 0.0
15	48.3	* 0.0	47.4	* 0.0	46.4	* 0.0
16	48.4	* 0.0	47.6	* 0.0	46.5	* 0.0
17	48.3	* 0.0	47.4	* 0.0	46.4	* 0.0
18	48.3	* 0.0	47.4	* 0.0	46.5	* 0.0
19	48.2	* 0.0	48.3	* 0.0	46.5	* 0.0
20	48.3	* 0.0	48.2	* 0.0	46.5	* 0.0
21	48.1	* 0.0	47.7	* 0.0	46.4	* 0.0
22	47.5	* 0.0	47.3	* 0.0	46.4	* 0.0
23	48.6	* 0.0	46.8	* 0.0	46.5	* 0.0
24	48.5	* 0.0	46.5	* 0.0	46.5	* 0.0
25	48.2	* 0.0	46.8	* 0.0	46.4	* 0.0
26	47.8	* 0.0	* 46.7	* 0.0	46.4	* 0.0
27	49.3	* 0.0	46.6	* 0.0	46.3	* 0.0
28	49.7	* 0.0	46.8	* 0.0	46.3	* 0.0
29	48.4	* 0.0	46.8	* 0.0	45.8	* 0.0
30	48.2	* 0.0	* 46.8	* 0.0	45.8	* 0.0
31	48.2	* 0.0	0.0	0.0	45.7	* 0.0
MEANS	48.9	0.0	47.7	0.0	46.4	0.0
OBSVNS.	31	0	28	0	30	0
YRLY.MEANS....................................					48.3	0.0
MAXIMUM	50.6	0.0	48.9	0.0	46.8	0.0
MINIMUM	47.5	0.0	46.5	0.0	45.7	0.0
STD.DEV.	.82	0.00	.70	0.00	.25	0.00

RACE ROCKS 48 17 57 N 123 31 48 W

	JANUARY		FEBRUARY		MARCH	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	45.0	31.1	44.6	30.8	45.5	31.2
2	45.1	30.8	45.0	31.4	45.7	31.4
3	* 45.0	* 30.8	44.6	31.6	46.0	31.8
4	44.8	30.8	45.1	31.1	46.4	31.6
5	44.7	31.4	45.0	31.4	46.3	31.6
6	44.4	31.2	44.8	31.5	46.4	31.4
7	44.2	31.0	44.7	30.8	46.6	31.6
8	43.8	31.4	44.8	31.1	* 46.4	* 31.6
9	44.2	31.4	* 44.6	* 31.0	* 46.2	* 31.5
10	44.2	31.1	44.3	30.8	46.0	31.5
11	44.5	31.2	44.6	30.8	46.3	31.2
12	44.6	31.2	44.2	30.4	46.0	31.4
13	44.8	31.2	44.6	30.8	46.5	31.5
14	44.8	31.1	44.7	30.8	46.3	31.4
15	45.0	31.6	44.9	30.8	45.8	31.1
16	45.0	31.8	45.3	31.0	45.7	31.1
17	45.1	31.6	45.3	31.1	46.0	31.4
18	45.2	31.5	46.0	31.5	46.5	32.0
19	44.8	31.5	45.7	31.4	46.6	32.1
20	45.3	31.2	46.5	30.8	47.0	31.9
21	45.0	31.4	46.0	31.1	47.3	31.9
22	45.2	31.4	45.9	31.5	47.5	31.8
23	45.1	31.2	45.4	31.5	47.1	31.8
24	45.0	31.5	45.0	31.1	46.7	31.2
25	44.6	31.4	45.0	31.2	46.4	31.1
26	44.3	31.4	45.4	30.8	46.3	31.4
27	44.5	31.1	45.2	31.2	46.4	31.1
28	* 44.5	* 31.2	45.4	31.2	46.3	31.1
29	44.5	31.2	0.0	0.0	46.5	31.2
30	44.3	31.1	0.0	0.0	46.6	31.1
31	44.5	30.8	0.0	0.0	46.3	31.0
MEANS	44.7	31.3	45.1	31.1	46.4	31.4
OBSVNS.	29	29	27	27	29	29
MAXIMUM	45.3	31.8	46.5	31.6	47.5	32.1
MINIMUM	43.8	30.8	44.2	30.4	45.5	31.0
STD.DEV.	.38	.25	.55	.31	.46	.31

RACE ROCKS 48 17 57 N 123 31 48 W

	APRIL		MAY		JUNE	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	47.0	31.6	47.4	31.8	47.5	31.8
2	47.1	31.2	47.2	31.6	48.0	31.9
3	47.1	31.1	47.6	31.9	48.2	32.0
4	47.2	31.4	47.1	32.0	48.1	32.3
5	47.2	31.8	46.5	32.3	48.2	32.1
6	47.1	32.0	46.6	32.4	48.1	31.9
7	46.8	32.1	46.3	32.1	48.5	31.8
8	46.8	31.9	46.4	32.3	48.0	31.5
9	46.7	32.0	46.7	31.8	48.0	31.4
10	46.8	31.5	46.8	31.9	48.2	31.6
11	46.5	31.2	47.3	31.8	48.6	31.9
12	47.4	31.5	47.5	31.9	49.5	31.6
13	47.2	31.6	48.0	31.9	49.8	31.8
14	47.4	31.4	49.0	32.1	49.2	31.6
15	47.3	31.5	48.3	32.3	48.8	31.5
16	48.1	31.6	47.7	31.9	48.9	31.8
17	47.0	31.9	47.5	32.0	48.3	32.0
18	47.3	31.8	47.3	32.0	48.0	32.1
19	47.5	31.8	47.3	32.0	49.3	31.9
20	47.0	31.9	47.6	32.0	49.2	31.8
21	46.7	32.0	47.7	31.8	49.8	31.9
22	47.3	31.8	48.0	32.0	49.2	31.9
23	47.4	31.8	48.2	31.6	48.6	32.1
24	47.5	31.8	48.3	31.9	48.6	32.0
25	47.5	31.6	47.8	31.5	48.8	31.2
26	47.5	31.6	47.7	32.0	50.0	31.0
27	47.2	31.6	48.3	32.0	49.2	31.4
28	47.3	31.5	49.2	31.6	49.0	32.0
29	47.4	31.8	49.4	31.6	48.4	31.4
30	48.0	31.6	48.5	32.0	49.6	31.9
31	0.0	0.0	47.8	32.0	0.0	0.0
MEANS	47.2	31.7	47.6	31.9	48.7	31.8
OBSVNS.	30	30	31	31	30	30
MAXIMUM	48.1	32.1	49.4	32.4	50.0	32.3
MINIMUM	46.5	31.1	46.3	31.5	47.5	31.0
STD.DEV.	.35	.25	.78	.22	.65	.29

RACE ROCKS 48 17 57 N 123 31 48 W

	JULY		AUGUST		SEPTEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	49.0	31.9	50.0	32.1	48.8	32.7
2	48.1	31.5	48.2	32.1	50.0	32.0
3	49.1	32.1	49.6	32.7	50.0	31.8
4	49.2	32.3	51.2	31.9	50.1	31.8
5	48.8	31.9	50.3	31.5	50.3	31.8
6	49.2	31.6	50.2	30.4	51.0	31.2
7	49.4	31.4	50.8	30.8	51.4	31.2
8	49.8	31.4	50.8	31.2	51.1	31.4
9	50.3	31.5	51.2	31.0	51.6	31.2
10	50.5	31.2	51.0	30.8	51.9	31.5
11	50.7	31.2	51.2	31.5	51.8	31.6
12	50.0	31.4	51.9	30.7	51.6	31.4
13	51.0	31.5	51.8	31.6	51.3	31.9
14	50.9	31.5	51.4	31.5	49.8	32.1
15	50.6	31.4	51.5	31.4	49.7	31.8
16	51.0	31.9	52.0	31.4	50.3	31.6
17	51.3	30.4	52.0	31.5	49.6	32.0
18	51.6	30.7	51.2	31.4	49.9	31.5
19	51.1	31.1	51.3	31.5	* 50.0	* 31.8
20	51.2	30.6	51.1	31.2	50.0	32.0
21	51.7	30.4	51.2	31.4	49.8	32.0
22	51.5	30.8	51.3	31.2	49.6	32.0
23	51.0	30.6	51.5	31.6	49.8	32.1
24	51.2	30.3	51.2	31.4	49.6	32.3
25	51.4	30.2	51.2	31.9	48.8	32.4
26	51.2	31.0	50.9	32.1	48.5	32.4
27	49.3	30.0	49.6	32.4	49.6	31.6
28	50.0	31.6	49.0	32.3	49.5	31.9
29	49.6	31.9	49.2	32.7	49.9	32.0
30	49.2	32.5	48.9	32.5	49.3	31.9
31	48.6	32.5	49.4	32.5	0.0	0.0
MEANS	50.2	31.3	50.7	31.6	50.2	31.8
OBSVNS.	31	31	31	31	29	29
MAXIMUM	51.7	32.5	52.0	32.7	51.9	32.7
MINIMUM	48.1	30.0	48.2	30.4	48.5	31.2
STD.DEV.	1.03	.67	1.00	.60	.93	.37

RACE ROCKS 48 17 57 N 123 31 48 W

	OCTOBER		NOVEMBER		DECEMBER	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	48.9	31.9	47.5	32.0	46.4	31.5
2	48.6	31.9	47.6	32.0	46.5	31.2
3	48.8	31.9	47.4	31.9	46.5	31.5
4	49.3	31.8	47.0	32.0	46.4	31.4
5	49.8	31.6	46.6	31.8	46.2	31.2
6	50.1	31.5	47.3	31.5	46.3	31.1
7	49.8	31.8	47.2	31.4	46.6	31.2
8	50.1	31.2	47.0	31.2	46.1	31.5
9	50.0	31.2	46.6	31.0	46.2	31.1
10	49.6	31.4	47.0	31.6	46.5	31.4
11	49.1	31.6	47.0	31.5	* 46.5	* 31.4
12	48.6	31.6	47.1	31.8	* 46.6	* 31.4
13	48.8	31.9	46.8	31.8	46.6	31.5
14	48.4	32.1	46.7	32.0	46.5	31.4
15	47.9	32.1	46.9	32.0	46.7	31.2
16	47.5	32.7	47.1	31.6	46.8	31.1
17	47.7	32.5	47.0	31.4	46.7	31.2
18	47.5	32.4	47.3	31.5	46.6	31.4
19	48.2	32.4	46.3	31.6	46.8	30.7
20	* 48.2	* 32.2	46.6	31.6	46.7	30.7
21	48.3	32.1	46.8	31.8	46.7	31.0
22	48.3	32.3	46.3	31.5	46.8	31.0
23	48.5	32.0	47.0	31.5	46.6	30.8
24	48.4	32.1	46.5	31.5	46.5	30.7
25	48.8	32.0	46.6	31.4	46.7	31.0
26	48.2	32.1	46.5	31.8	46.4	31.1
27	48.6	31.9	46.4	31.6	46.5	30.8
28	48.4	32.1	46.7	31.6	46.4	30.8
29	48.1	32.0	46.6	31.4	46.3	30.6
30	48.0	32.1	46.3	31.8	45.9	30.8
31	47.7	32.0	0.0	0.0	45.1	31.0
MEANS	48.7	31.9	46.9	31.6	46.4	31.1
OBSVNS.	30	30	30	30	29	29
YRLY.MEANS....................................					47.8	31.6
MAXIMUM	50.1	32.7	47.6	32.0	46.8	31.5
MINIMUM	47.5	31.2	46.3	31.0	45.1	30.6
STD.DEV.	.76	.35	.36	.25	.34	.28

CAPE MUDGE 49 59 56 N 125 11 38 W

	JANUARY		FEBRUARY		MARCH	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	44.6	28.4	* 44.7	* 28.8	45.5	29.1
2	42.1	28.1	44.9	28.9	45.0	28.8
3	45.3	28.9	44.3	28.9	45.0	29.0
4	45.5	29.0	45.0	29.3	46.1	29.1
5	45.0	28.9	41.9	28.5	44.9	28.5
6	45.0	29.4	40.0	28.2	47.0	28.9
7	* 43.4	* 29.1	42.5	28.9	45.7	29.1
8	* 41.8	* 28.8	43.3	28.8	44.5	28.8
9	40.2	28.6	43.9	29.3	44.5	29.0
10	41.2	29.0	44.5	29.3	45.3	29.3
11	* 0.0	* 0.0	43.0	28.9	45.1	29.0
12	* 0.0	* 0.0	44.0	29.0	* 45.6	* 29.0
13	* 0.0	* 0.0	44.1	29.1	46.2	28.9
14	44.5	28.5	45.0	29.4	46.0	28.9
15	* 44.6	* 28.5	* 45.0	* 29.4	* 46.0	* 29.1
16	* 44.8	* 28.5	44.9	29.3	46.1	29.3
17	44.9	28.5	45.5	29.4	* 46.3	* 29.1
18	45.1	29.0	45.0	29.3	* 46.6	* 28.9
19	43.6	28.2	42.6	28.6	46.8	28.8
20	* 0.0	* 0.0	43.3	28.9	* 46.4	* 28.9
21	* 0.0	* 0.0	43.7	28.9	46.0	29.0
22	* 0.0	* 0.0	43.6	29.1	45.2	28.6
23	* 0.0	* 0.0	44.4	29.0	44.2	29.0
24	44.0	28.2	44.3	29.0	45.4	29.1
25	42.8	28.1	44.5	29.3	44.8	29.0
26	43.8	28.1	44.1	28.5	44.5	28.9
27	43.6	28.4	* 44.7	* 28.7	44.9	28.6
28	* 43.4	* 28.5	45.3	28.9	46.2	29.0
29	43.3	28.6	0.0	0.0	45.2	28.6
30	* 43.9	* 28.7	0.0	0.0	* 45.8	* 28.8
31	44.5	28.8	0.0	0.0	46.5	29.1
MEANS	43.8	28.6	43.9	29.0	45.5	28.9
OBSVNS.	18	18	25	25	25	25
MAXIMUM	45.5	29.4	45.5	29.4	47.0	29.3
MINIMUM	40.2	28.1	40.0	28.2	44.2	28.5
STD.DEV.	1.47	.38	1.23	.31	.76	.21

CAPE MUDGE 49 59 56 N 125 11 38 W

	APRIL		MAY		JUNE	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	48.8	29.1	51.0	29.3	52.6	29.1
2	47.6	29.0	51.8	29.1	47.1	29.5
3	47.6	28.8	49.4	29.4	47.2	29.5
4	46.0	29.0	46.1	29.5	48.0	29.5
5	46.2	29.3	47.1	29.5	48.1	29.4
6	44.3	29.3	47.4	29.5	* 49.4	* 29.4
7	45.2	29.4	46.8	29.8	50.8	29.4
8	45.9	29.5	47.9	29.9	49.6	29.3
9	46.2	29.4	48.5	29.9	54.5	28.1
10	47.0	29.3	50.0	29.7	52.0	27.3
11	47.5	29.3	50.1	28.5	53.2	28.1
12	49.2	29.5	51.9	29.5	* 53.9	* 28.2
13	47.1	29.4	57.5	29.3	* 54.7	* 28.4
14	* 47.2	* 29.4	56.0	29.1	55.5	28.5
15	* 47.3	* 29.4	56.0	28.5	52.1	28.1
16	47.4	29.4	56.5	29.7	* 53.2	* 28.3
17	48.2	29.3	55.0	28.5	54.2	28.5
18	50.0	29.3	53.8	29.1	54.0	28.0
19	50.0	29.0	47.6	29.5	50.8	28.8
20	45.8	29.5	48.5	29.0	51.4	28.9
21	46.5	29.5	47.5	29.8	56.0	27.7
22	46.5	29.4	48.5	29.4	56.0	27.7
23	45.8	29.5	* 48.6	* 29.6	55.0	27.7
24	47.5	29.3	48.6	29.7	52.3	30.4
25	47.9	29.1	52.8	30.0	58.8	28.0
26	49.9	29.3	55.0	29.5	60.1	27.7
27	51.4	29.4	51.0	29.4	59.5	28.2
28	51.7	29.1	57.0	28.8	55.8	28.1
29	* 52.5	* 29.2	58.3	28.6	55.2	28.8
30	53.3	29.3	56.5	29.0	53.5	29.3
31	0.0	0.0	55.1	29.1	0.0	0.0
MEANS	47.8	29.3	51.6	29.3	53.2	28.6
OBSVNS.	27	27	30	30	26	26
MAXIMUM	53.3	29.5	58.3	30.0	60.1	30.4
MINIMUM	44.3	28.8	46.1	28.5	47.1	27.3
STD.DEV.	2.14	.19	3.82	.43	3.55	.78

CAPE MUDGE 49 59 56 N 125 11 38 W

	JULY		AUGUST		SEPTEMBER	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	51.2	28.8	51.5	28.6	51.8	29.0
2	53.8	28.6	53.0	28.2	53.8	28.1
3	52.5	29.0	52.1	28.5	52.4	28.6
4	53.0	28.0	54.8	27.7	55.3	28.0
5	54.4	27.7	54.0	28.8	55.1	27.7
6	53.8	27.8	55.4	28.5	54.4	28.0
7	55.0	27.7	54.9	28.1	55.0	28.2
8	57.7	27.2	61.4	27.4	55.2	28.0
9	60.4	27.4	* 59.4	* 27.6	57.5	28.1
10	61.2	28.5	* 57.4	* 27.9	57.9	27.7
11	66.6	27.7	55.4	28.1	58.5	27.6
12	59.0	28.5	56.5	28.5	54.3	28.0
13	56.5	27.4	58.2	27.7	51.4	28.8
14	53.0	28.2	54.5	28.8	52.9	28.9
15	54.4	28.4	49.9	29.1	50.9	26.5
16	52.7	28.6	49.2	29.4	52.5	27.4
17	51.0	28.9	45.6	29.1	50.9	27.4
18	54.6	28.5	50.4	28.9	54.1	28.5
19	54.5	27.7	51.5	29.1	52.6	27.2
20	54.3	27.4	55.6	28.4	53.0	27.7
21	52.8	27.4	58.5	27.6	55.7	27.8
22	54.5	27.4	54.8	28.6	54.9	27.6
23	55.1	27.8	55.2	27.8	59.0	27.8
24	54.4	28.0	59.5	28.5	58.8	27.8
25	55.2	28.0	56.4	26.8	52.7	29.0
26	60.0	27.8	63.0	27.6	51.3	29.5
27	60.1	27.8	55.8	28.5	54.0	29.1
28	59.9	27.3	55.5	26.9	51.9	29.1
29	53.4	28.8	50.8	29.0	51.4	29.1
30	51.8	28.5	54.0	27.8	50.2	29.1
31	60.9	29.5	51.4	28.8	0.0	0.0
MEANS	55.7	28.1	54.4	28.3	54.0	28.2
OBSVNS.	31	31	29	29	30	30
MAXIMUM	66.6	29.5	63.0	29.4	59.0	29.5
MINIMUM	51.0	27.2	45.6	26.8	50.2	26.5
STD.DEV.	3.62	.59	3.70	.67	2.49	.71

CAPE MUDGE 49 59 56 N 125 11 38 W

	OCTOBER		NOVEMBER		DECEMBER	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	51.3	28.6	* 48.0	* 28.2	44.8	27.6
2	52.0	28.4	47.5	27.7	44.5	27.3
3	53.5	28.2	* 47.2	* 28.2	46.0	28.4
4	53.3	27.7	47.0	28.8	44.5	27.4
5	51.0	28.8	45.5	26.8	* 45.0	* 27.9
6	* 51.4	* 28.2	* 46.4	* 28.0	* 45.6	* 28.5
7	51.8	27.7	47.3	29.3	46.2	29.1
8	50.8	28.9	47.3	29.3	46.4	28.6
9	52.9	28.9	44.6	28.8	46.6	29.3
10	49.2	29.9	46.9	29.7	46.0	28.9
11	49.6	29.9	* 47.2	* 29.8	46.2	28.9
12	* 49.1	* 29.8	47.5	30.0	* 45.8	* 28.8
13	48.6	29.7	45.4	28.4	* 45.4	* 28.7
14	49.4	29.5	44.5	29.0	45.0	28.6
15	48.6	29.4	44.8	28.6	* 45.4	* 28.5
16	49.0	29.1	44.8	28.1	45.8	28.4
17	* 49.4	* 28.8	44.6	28.6	45.6	27.8
18	49.7	28.4	45.3	28.9	45.0	27.8
19	49.4	28.6	* 45.7	* 28.9	45.0	28.0
20	49.8	28.6	* 46.1	* 29.0	45.7	27.6
21	49.6	28.6	46.5	29.0	45.7	28.2
22	51.1	29.3	45.9	28.6	46.4	28.9
23	49.9	28.8	45.6	29.1	45.9	* 28.7
24	* 49.8	* 28.8	* 46.0	* 29.2	45.9	28.5
25	49.6	28.8	46.5	29.4	46.1	28.9
26	48.7	28.8	* 46.0	* 29.1	46.3	29.4
27	49.1	29.1	* 45.5	* 28.8	44.9	28.9
28	49.0	29.3	45.0	28.5	44.1	28.0
29	49.0	28.8	44.8	27.7	43.0	27.3
30	48.5	29.1	44.9	28.0	43.1	27.6
31	48.5	28.8	0.0	0.0	41.0	28.2
MEANS	50.1	28.9	45.8	28.7	45.2	28.3
OBSVNS.	27	27	21	21	26	25
YRLY.MEANS....................................					49.7	28.7
MAXIMUM	53.5	29.9	47.5	30.0	46.6	29.4
MINIMUM	48.5	27.7	44.5	26.8	41.0	27.3
STD.DEV.	1.51	.55	1.08	.74	1.29	.64

SISTERS ISLAND 49 29 13 N 124 26 00 W

	JANUARY		FEBRUARY		MARCH	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	45.0	29.1	43.0	28.6	44.4	28.4
2	44.1	29.0	43.4	28.5	44.1	28.5
3	44.1	29.1	43.2	28.5	44.0	28.6
4	42.9	28.6	42.5	28.5	44.7	28.4
5	43.4	28.9	42.8	28.5	44.1	28.0
6	41.4	28.1	42.6	28.6	43.8	28.1
7	41.2	27.2	41.7	28.6	44.1	28.4
8	40.1	27.2	42.2	28.6	43.9	28.2
9	39.1	26.8	42.1	28.6	44.3	28.2
10	38.8	26.5	42.2	28.4	44.6	28.4
11	41.6	28.2	42.4	28.4	44.4	28.5
12	43.1	28.6	42.3	28.5	44.6	28.4
13	44.2	28.9	42.6	28.4	44.5	28.5
14	43.2	28.4	42.5	28.5	44.6	28.6
15	43.4	28.4	42.8	28.5	44.8	28.6
16	43.8	28.5	43.0	28.5	44.9	28.8
17	44.0	28.8	44.0	28.8	44.5	28.8
18	43.0	28.2	43.4	28.4	44.8	29.1
19	42.7	27.8	42.8	28.2	45.0	29.4
20	43.8	28.4	42.8	28.4	45.0	29.3
21	43.2	28.5	42.5	28.4	44.5	29.0
22	43.0	28.5	42.6	28.2	44.6	28.9
23	43.9	28.6	43.0	28.2	44.6	28.8
24	43.0	28.2	42.9	28.2	45.2	28.2
25	43.0	28.1	43.3	28.1	45.1	28.8
26	42.5	28.2	43.9	28.6	45.4	28.8
27	42.8	28.2	44.8	29.0	45.4	28.8
28	43.0	28.4	44.6	28.8	45.4	28.6
29	42.9	28.4	0.0	0.0	45.7	28.8
30	43.0	28.5	0.0	0.0	45.8	28.8
31	43.2	28.5	0.0	0.0	45.6	28.8
MEANS	42.8	28.3	42.9	28.5	44.7	28.6
OBSVNS.	31	31	28	28	31	31
MAXIMUM	45.0	29.1	44.8	29.0	45.8	29.4
MINIMUM	38.8	26.5	41.7	28.1	43.8	28.0
STD.DEV.	1.41	.62	.72	.20	.54	.33

SISTERS ISLAND 49 29 13 N 124 26 00 W

	APRIL		MAY		JUNE	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	46.0	28.9	49.9	29.5	50.0	29.3
2	46.3	28.6	50.6	29.4	53.0	28.6
3	46.5	28.5	50.8	29.3	54.4	28.5
4	47.3	28.8	50.3	29.4	55.0	28.4
5	46.3	28.9	51.3	29.1	56.2	27.6
6	46.0	28.9	50.7	29.4	56.5	26.5
7	45.6	28.8	49.7	29.3	54.8	28.4
8	46.7	28.9	50.8	29.1	52.8	28.5
9	46.2	28.8	51.0	29.0	53.4	28.6
10	48.4	28.6	50.7	28.9	54.9	28.2
11	47.9	28.9	52.2	28.6	56.7	26.7
12	48.6	28.8	54.9	25.6	56.0	26.7
13	47.3	29.0	57.2	25.8	54.9	26.8
14	47.7	28.8	58.0	25.9	54.9	26.0
15	47.6	28.6	56.4	27.3	55.1	25.6
16	48.4	28.9	59.3	27.6	54.0	26.1
17	48.0	28.8	57.3	27.1	56.2	21.2
18	47.0	28.9	56.8	28.8	55.5	20.1
19	47.2	28.9	56.1	28.2	55.1	22.7
20	47.2	29.1	54.3	28.5	56.4	22.0
21	47.5	28.9	54.3	28.9	59.5	18.0
22	47.0	28.6	53.9	28.6	57.8	23.0
23	48.0	28.9	52.5	29.0	57.9	25.0
24	48.5	29.3	50.5	29.1	56.7	24.8
25	49.7	29.1	53.0	28.4	60.3	24.3
26	49.8	29.1	55.4	25.2	58.0	25.2
27	47.9	29.4	55.2	25.0	60.8	24.0
28	49.5	29.3	56.4	26.1	59.8	25.5
29	46.9	29.3	57.2	26.3	59.9	25.6
30	49.8	29.3	53.0	28.5	59.2	26.4
31	0.0	0.0	54.3	28.2	0.0	0.0
MEANS	47.6	28.9	53.7	28.0	56.2	25.6
OBSVNS.	30	30	31	31	30	30
MAXIMUM	49.8	29.4	59.3	29.5	60.8	29.3
MINIMUM	45.6	28.5	49.7	25.0	50.0	18.0
STD.DEV.	1.17	.23	2.82	1.42	2.50	2.76

SISTERS ISLAND 49 29 13 N 124 26 00 W

	JULY		AUGUST		SEPTEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	59.0	26.5	63.0	26.0	58.0	27.3
2	58.0	26.5	62.5	26.4	59.5	27.2
3	59.5	26.3	63.0	26.7	59.5	27.2
4	59.6	25.2	63.7	26.4	60.0	26.9
5	59.0	23.0	63.0	26.4	62.0	27.1
6	59.4	21.7	65.0	26.3	58.0	28.0
7	59.2	21.3	66.7	26.1	60.0	28.0
8	58.5	21.4	66.5	26.4	58.5	27.7
9	62.0	21.2	65.9	26.4	59.5	27.7
10	62.2	21.4	65.1	26.9	61.0	27.6
11	62.6	22.2	64.4	26.3	62.9	27.6
12	63.2	21.3	65.2	26.4	60.5	27.8
13	62.3	23.8	63.4	26.7	59.3	27.7
14	62.8	23.5	64.4	26.8	60.0	28.1
15	61.8	25.1	62.4	26.9	59.9	28.0
16	61.0	26.4	62.4	26.8	59.5	28.0
17	63.8	25.2	61.6	26.8	59.3	28.0
18	58.6	27.2	61.5	26.8	58.7	28.4
19	60.4	27.6	60.0	27.3	59.3	28.2
20	58.4	27.7	60.8	27.1	56.8	28.2
21	58.7	27.3	61.2	27.2	57.7	28.1
22	60.1	26.7	60.8	27.3	57.1	28.1
23	60.6	26.1	62.1	27.1	57.3	28.1
24	60.7	23.3	62.0	27.2	57.2	27.8
25	61.0	24.6	63.0	27.1	57.3	28.1
26	61.0	24.4	62.5	27.1	55.4	28.2
27	63.4	24.7	61.6	27.2	56.0	28.5
28	64.3	23.9	60.0	27.4	57.0	28.2
29	64.0	25.0	60.0	27.3	56.0	28.1
30	64.0	26.3	59.2	27.6	55.0	28.2
31	63.5	25.9	57.5	28.1	0.0	0.0
MEANS	61.1	24.6	62.6	26.9	58.6	27.9
OBSVNS.	31	31	31	31	30	30
MAXIMUM	64.3	27.7	66.7	28.1	62.9	28.5
MINIMUM	58.0	21.2	57.5	26.0	55.0	26.9
STD.DEV.	1.97	2.11	2.17	.48	1.89	.40

SISTERS ISLAND 49 29 13 N 124 26 00 W

	OCTOBER		NOVEMBER		DECEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	54.5	28.5	49.0	28.6	46.0	28.9
2	54.8	28.4	48.9	28.6	45.6	28.8
3	54.6	28.6	48.5	28.5	46.0	28.9
4	54.4	28.5	48.0	28.1	45.6	28.6
5	54.6	28.4	48.2	29.0	45.8	29.0
6	53.8	28.6	47.5	28.8	46.2	29.1
7	53.0	28.8	47.5	28.6	45.9	28.9
8	53.9	28.6	47.5	28.5	45.6	28.6
9	53.7	28.8	46.5	28.5	45.2	28.2
10	53.0	28.9	47.0	28.6	45.3	28.4
11	53.0	29.1	47.3	28.5	46.0	28.9
12	52.9	28.6	47.2	28.6	46.0	28.9
13	53.1	28.6	46.5	28.0	45.6	29.0
14	52.4	28.9	46.5	28.5	45.1	28.5
15	51.6	28.8	46.9	28.8	45.5	28.1
16	51.4	28.0	46.7	28.9	45.4	28.1
17	51.8	28.1	46.6	28.9	45.6	27.6
18	51.5	27.8	45.7	29.0	45.2	28.2
19	51.3	28.1	45.9	28.6	44.8	27.8
20	51.3	28.0	46.2	28.9	45.1	28.1
21	51.4	27.8	45.8	28.9	44.9	28.0
22	51.9	28.5	45.7	28.9	45.7	28.1
23	51.2	28.5	45.2	28.8	45.0	28.1
24	50.8	28.9	45.6	28.9	44.8	28.2
25	50.8	28.6	45.5	29.0	44.7	28.4
26	51.3	28.8	45.2	29.0	44.7	28.6
27	50.2	28.6	45.5	29.0	44.2	28.8
28	50.3	28.6	45.7	29.0	44.2	28.8
29	50.2	28.4	45.8	29.1	44.2	28.4
30	50.0	28.1	45.3	29.3	44.4	28.4
31	49.5	28.4	0.0	0.0	44.0	28.4
MEANS	52.2	28.5	46.6	28.7	45.2	28.5
OBSVNS.	31	31	30	30	31	31
YRLY.MEANS....................................					51.2	27.7
MAXIMUM	54.8	29.1	49.0	29.3	46.2	29.1
MINIMUM	49.5	27.8	45.2	28.0	44.0	27.6
STD.DEV.	1.56	.33	1.12	.29	.62	.39

CHROME ISLAND 49 28 20 N 124 40 57 W

	JANUARY		FEBRUARY		MARCH	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	45.0	29.7	44.5	28.6	44.8	27.5
2	44.8	29.5	43.6	29.3	45.0	29.3
3	43.8	27.7	43.6	28.6	45.0	29.8
4	43.6	28.8	43.0	28.2	45.0	29.5
5	43.7	29.0	43.0	29.0	45.0	29.3
6	42.8	28.8	42.8	28.9	45.4	29.5
7	43.4	28.9	43.6	29.1	45.5	28.6
8	42.8	28.9	42.0	29.1	45.0	28.8
9	41.9	28.9	42.5	29.1	44.9	28.4
10	42.3	29.0	42.6	28.8	45.0	29.3
11	42.8	28.8	42.7	29.3	44.5	28.8
12	43.5	29.1	42.4	28.0	45.0	29.3
13	44.0	28.9	42.5	28.2	44.7	29.3
14	43.9	28.6	42.5	29.0	45.2	29.3
15	44.5	28.8	42.7	28.5	45.2	29.1
16	44.8	29.1	43.4	28.5	45.5	29.1
17	44.9	29.1	43.9	29.3	45.2	29.1
18	44.1	29.1	44.0	29.0	45.2	29.3
19	42.8	24.3	44.0	29.0	45.2	29.4
20	43.0	29.1	44.0	29.8	45.3	29.5
21	43.5	29.1	43.4	29.8	44.5	28.9
22	44.3	28.9	43.0	29.3	44.7	28.9
23	44.4	29.3	43.8	29.0	44.6	28.6
24	44.5	29.3	43.5	29.1	45.2	28.8
25	40.0	18.3	43.8	28.4	45.5	28.2
26	41.9	25.2	44.2	28.8	45.3	27.1
27	42.0	28.6	44.4	28.9	45.5	28.2
28	42.4	29.1	44.8	29.3	45.8	28.4
29	42.0	28.9	0.0	0.0	46.5	28.9
30	43.2	29.8	0.0	0.0	46.0	28.8
31	43.0	30.0	0.0	0.0	45.5	29.1
MEANS	43.3	28.4	43.4	28.9	45.2	28.9
OBSVNS.	31	31	28	28	31	31
MAXIMUM	45.0	30.0	44.8	29.8	46.5	29.8
MINIMUM	40.0	18.3	42.0	28.0	44.5	27.1
STD.DEV.	1.13	2.20	.73	.44	.43	.58

CHROME ISLAND 49 28 20 N 124 40 57 W

DATE	APRIL TEMP	APRIL SAL	MAY TEMP	MAY SAL	JUNE TEMP	JUNE SAL
						1973
1	46.8	28.9	51.5	29.3	55.7	28.5
2	46.8	28.9	50.8	29.3	55.1	28.2
3	46.3	29.5	49.6	29.3	54.8	28.2
4	46.1	29.0	52.0	29.4	56.5	28.5
5	46.1	29.1	50.4	29.1	56.2	28.6
6	45.8	30.0	49.5	29.5	52.2	29.7
7	46.0	29.5	47.9	29.7	51.1	29.4
8	45.6	30.0	47.3	29.8	52.2	29.8
9	45.8	29.3	47.4	30.3	52.6	29.5
10	46.7	29.0	48.7	29.8	54.0	29.5
11	47.8	29.4	50.1	29.9	54.5	29.4
12	48.7	28.9	52.5	29.7	53.2	29.8
13	49.4	28.5	51.5	29.5	53.8	29.3
14	48.6	29.4	52.4	29.4	53.0	29.8
15	48.0	28.8	55.5	29.3	52.3	29.4
16	47.4	29.3	52.5	29.1	52.7	29.0
17	47.5	29.0	55.0	29.3	53.0	29.0
18	46.9	29.0	55.7	29.1	52.8	29.3
19	48.5	29.3	55.0	28.4	53.1	28.9
20	48.0	28.9	54.4	26.8	54.0	29.0
21	48.4	29.0	54.8	29.0	56.5	28.5
22	47.6	29.3	52.5	29.9	59.1	26.7
23	47.6	30.2	* 51.0	* 29.8	59.5	25.5
24	48.4	29.1	49.5	29.8	56.2	27.5
25	48.0	28.6	50.1	29.7	56.8	28.2
26	48.0	29.0	53.0	28.1	60.0	27.4
27	47.6	29.7	53.7	27.8	61.7	26.4
28	49.4	29.8	55.7	27.4	60.5	26.4
29	51.5	29.1	58.2	26.3	59.7	28.1
30	51.4	29.1	54.4	28.8	60.0	26.4
31	0.0	0.0	55.0	28.2	0.0	0.0
MEANS	47.7	29.2	52.3	29.0	55.4	28.5
OBSVNS.	30	30	30	30	30	30
MAXIMUM	51.5	30.2	58.2	30.3	61.7	29.8
MINIMUM	45.6	28.5	47.3	26.3	51.1	25.5
STD.DEV.	1.47	.41	2.85	.95	3.01	1.19

CHROME ISLAND 49 28 20 N 124 40 57 W

	JULY		AUGUST		SEPTEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	58.7	26.9	65.4	26.5	57.8	28.0
2	57.7	27.6	64.6	25.6	59.0	27.7
3	57.8	27.1	65.5	27.2	58.6	27.6
4	58.0	26.7	65.6	26.7	59.9	27.7
5	57.4	26.9	65.5	26.4	60.7	27.7
6	56.8	27.3	65.4	27.7	54.8	29.1
7	56.3	27.8	67.0	27.4	57.0	29.0
8	55.9	27.8	66.8	27.1	56.5	28.8
9	57.7	28.2	66.5	27.4	59.0	28.2
10	57.8	28.4	67.2	27.3	57.8	28.9
11	57.5	28.1	67.0	27.4	58.0	28.8
12	61.0	25.6	66.0	27.7	58.8	29.0
13	63.1	24.6	65.5	26.9	59.2	28.2
14	63.0	24.3	66.6	27.6	62.0	28.0
15	63.5	24.6	65.4	27.4	60.5	28.2
16	63.5	24.8	62.0	28.8	59.6	28.0
17	63.1	25.8	62.3	28.4	56.5	28.9
18	64.1	26.0	59.2	28.1	56.5	28.4
19	64.5	25.6	59.0	28.5	54.7	27.7
20	65.3	25.1	60.0	27.7	54.4	29.1
21	62.5	26.0	59.0	28.5	54.2	28.9
22	60.8	26.7	60.0	28.5	55.2	28.8
23	59.8	27.4	59.8	28.8	54.4	29.1
24	58.8	27.7	58.5	28.4	53.4	29.1
25	56.0	27.7	61.4	29.3	53.8	30.0
26	61.0	27.4	60.2	28.8	54.8	29.8
27	63.8	26.0	59.3	28.0	53.3	29.4
28	64.8	26.4	57.8	28.4	53.2	29.4
29	66.6	25.6	57.3	28.5	52.6	29.9
30	66.3	26.5	58.3	28.5	52.3	29.3
31	66.0	26.1	58.0	28.2	0.0	0.0
MEANS	60.9	26.5	62.6	27.8	56.6	28.7
OBSVNS.	31	31	31	31	30	30
MAXIMUM	66.6	28.4	67.2	29.3	62.0	30.0
MINIMUM	55.9	24.3	57.3	25.6	52.3	27.6
STD.DEV.	3.43	1.16	3.50	.84	2.73	.70

CHROME ISLAND 49 28 20 N 124 40 57 W

	OCTOBER		NOVEMBER		DECEMBER	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	52.2	29.1	49.0	28.6	45.8	29.3
2	52.6	29.8	48.4	28.2	45.2	28.1
3	53.6	29.1	48.9	28.6	45.7	29.3
4	53.6	29.3	48.0	28.8	46.0	28.8
5	53.1	29.1	47.4	29.3	45.6	28.9
6	53.0	29.0	47.6	29.7	46.0	29.3
7	53.4	28.8	47.8	28.9	45.7	26.7
8	53.2	29.7	47.5	28.9	46.0	24.7
9	53.6	29.0	46.5	28.8	45.4	27.3
10	52.8	28.9	46.7	28.5	45.8	29.0
11	52.5	29.0	47.0	28.9	46.2	29.0
12	51.5	28.9	47.4	28.6	46.0	29.5
13	51.8	28.9	47.6	29.0	46.2	29.3
14	50.4	29.5	47.5	28.9	46.0	29.1
15	50.2	29.1	47.4	29.3	46.0	29.3
16	50.1	29.7	46.8	28.5	46.3	29.4
17	50.4	29.4	46.6	28.8	45.2	25.5
18	50.4	29.3	46.0	28.8	43.9	25.2
19	50.4	29.3	45.7	28.8	44.2	27.3
20	50.3	29.4	46.6	28.9	45.6	28.6
21	50.2	29.4	45.4	29.0	44.6	26.8
22	50.4	29.4	45.8	28.5	45.3	28.0
23	50.0	29.5	45.6	29.0	45.2	27.2
24	49.8	29.5	45.4	28.6	45.4	28.8
25	49.4	29.7	46.0	29.0	44.3	26.8
26	49.4	29.5	46.0	29.3	44.6	28.4
27	49.4	29.8	46.3	29.3	44.4	28.6
28	49.8	28.8	45.9	29.4	44.4	28.6
29	49.2	29.5	46.3	29.3	44.6	28.4
30	49.4	29.4	45.0	29.3	44.3	28.1
31	49.0	29.1	0.0	0.0	44.2	28.4
MEANS	51.1	29.3	46.9	28.9	45.3	28.1
OBSVNS.	31	31	30	30	31	31
YRLY.MEANS.....................................					50.9	28.5
MAXIMUM	53.6	29.8	49.0	29.7	46.3	29.5
MINIMUM	49.0	28.8	45.4	28.2	43.9	24.7
STD.DEV.	1.58	.30	.97	.34	.73	1.29

ENTRANCE ISLAND 49 12 34 N 123 48 27 W

	JANUARY		FEBRUARY		MARCH	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	45.0	* 27.2	43.9	28.6	45.6	28.2
2	45.0	26.5	43.8	28.8	45.0	27.8
3	43.2	28.4	43.3	28.0	44.5	28.4
4	42.5	28.0	42.4	28.2	45.7	28.8
5	43.8	27.8	42.2	28.1	44.9	26.6
6	42.5	28.2	42.0	27.7	46.0	25.6
7	42.0	28.4	40.0	27.2	46.1	26.0
8	41.8	28.2	40.6	27.3	44.5	25.2
9	39.8	27.4	40.8	27.2	44.3	26.7
10	37.2	25.4	41.4	27.3	44.4	27.6
11	42.9	28.5	42.1	27.6	44.5	27.8
12	43.5	28.8	41.5	27.6	44.8	27.4
13	44.4	29.0	42.0	27.6	44.6	27.3
14	45.0	29.0	42.2	28.1	44.7	27.6
15	45.6	29.1	43.0	28.1	44.9	28.4
16	46.2	29.5	43.6	28.4	45.4	29.1
17	43.9	25.5	43.3	28.4	44.7	29.0
18	44.8	28.9	42.5	27.4	45.0	29.5
19	43.3	27.8	42.3	26.7	45.6	29.5
20	45.0	29.1	41.8	27.1	45.6	29.4
21	45.0	29.0	42.5	27.6	45.2	29.3
22	44.8	29.3	42.8	27.8	45.3	28.1
23	45.4	29.5	42.9	27.4	45.5	27.6
24	45.5	29.7	43.0	27.3	45.9	27.2
25	42.0	26.4	43.1	26.9	45.4	27.8
26	42.2	26.7	43.8	28.2	45.3	28.0
27	42.3	27.7	* 44.2	* 28.1	45.5	27.8
28	42.1	27.4	44.7	28.0	46.0	27.8
29	42.3	27.3	0.0	0.0	46.3	28.0
30	43.3	27.8	0.0	0.0	46.6	28.4
31	43.0	27.6	0.0	0.0	46.0	28.8
MEANS	43.4	28.1	42.5	27.7	45.3	27.9
OBSVNS.	31	30	27	27	31	31
MAXIMUM	46.2	29.7	44.7	28.8	46.6	29.5
MINIMUM	37.2	25.4	40.0	26.7	44.3	25.2
STD.DEV.	1.87	1.14	1.08	.53	.62	1.08

ENTRANCE ISLAND 49 12 34 N 123 48 27 W

	APRIL		MAY		JUNE	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	46.2	29.0	53.0	28.6	55.4	26.5
2	46.9	28.8	49.6	28.5	55.6	27.3
3	46.8	28.9	47.5	29.1	55.8	27.1
4	47.2	28.9	53.0	26.8	56.2	27.2
5	46.4	28.9	50.5	28.9	54.0	27.6
6	47.0	28.6	48.4	27.7	53.8	27.1
7	48.1	28.6	48.2	29.1	52.4	28.1
8	48.3	28.4	47.7	29.7	51.8	27.6
9	47.7	28.4	47.2	29.4	56.2	16.2
10	47.8	28.4	48.5	29.4	56.8	16.3
11	48.6	28.1	50.7	28.9	58.3	16.9
12	48.3	28.5	57.2	25.4	53.9	28.9
13	49.5	28.5	58.8	24.8	53.2	28.4
14	49.7	28.5	60.7	24.3	53.0	28.2
15	49.0	28.6	61.0	25.2	52.3	28.2
16	46.6	29.1	57.5	26.4	51.6	28.6
17	47.7	29.0	56.8	26.8	53.3	27.7
18	47.8	29.0	59.0	26.8	52.2	28.8
19	51.2	28.5	51.9	28.0	54.0	28.8
20	49.5	28.6	54.5	28.0	58.8	26.3
21	48.5	27.6	* 52.4	* 28.4	63.5	14.2
22	48.9	27.3	50.3	28.9	61.1	15.4
23	49.2	27.3	48.0	29.7	57.8	22.2
24	48.6	28.8	48.7	29.7	53.0	27.8
25	48.9	28.1	50.5	26.7	56.4	26.3
26	49.5	28.5	54.8	22.0	66.0	14.9
27	50.0	28.4	54.2	22.1	63.4	18.0
28	51.0	27.7	55.7	24.0	61.0	19.5
29	55.5	27.6	58.3	18.4	61.3	20.4
30	55.5	27.8	55.2	25.0	62.0	19.4
31	0.0	0.0	54.5	26.3	0.0	0.0
MEANS	48.9	28.4	53.1	26.8	56.5	24.0
OBSVNS.	30	30	30	30	30	30
MAXIMUM	55.5	29.1	61.0	29.7	66.0	28.9
MINIMUM	46.2	27.3	47.2	18.4	51.6	14.2
STD.DEV.	2.20	.51	4.28	2.72	4.01	5.22

ENTRANCE ISLAND 49 12 34 N 123 48 27 W

	JULY		AUGUST		SEPTEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	59.1	24.8	63.2	24.2	59.6	24.6
2	60.5	25.1	63.8	24.7	60.1	24.6
3	59.1	22.7	64.2	24.7	59.7	25.1
4	58.0	25.2	64.0	23.7	60.5	25.2
5	58.0	25.1	63.3	25.1	62.5	25.9
6	56.3	24.6	63.4	26.0	59.5	26.7
7	55.0	27.1	66.3	24.4	58.5	28.8
8	55.1	27.6	66.8	24.8	* 59.5	* 28.0
9	60.0	24.7	67.3	21.4	60.5	27.2
10	58.0	25.5	66.9	22.5	61.0	26.9
11	63.8	15.2	66.1	24.4	59.8	26.5
12	63.0	16.6	66.0	25.2	58.5	27.3
13	62.4	20.8	66.6	25.6	* 58.9	* 27.3
14	63.0	21.7	64.5	26.0	59.3	27.3
15	61.4	24.4	62.5	26.3	57.4	26.4
16	61.2	24.7	61.4	26.7	58.6	27.1
17	60.2	25.4	59.5	26.7	59.5	26.9
18	61.8	24.7	59.7	27.1	54.3	29.1
19	62.5	24.7	60.0	24.8	52.5	29.3
20	60.0	25.4	60.9	24.0	56.2	29.4
21	58.3	26.0	62.9	25.9	54.5	27.8
22	58.4	26.3	62.0	24.7	56.5	25.2
23	59.6	26.5	61.1	26.3	57.6	28.1
24	59.0	26.7	61.8	26.7	57.5	26.5
25	58.9	25.4	63.0	25.9	* 56.5	* 28.2
26	63.3	21.4	62.6	26.0	55.5	29.8
27	* 63.9	* 21.5	61.8	21.7	54.6	28.8
28	64.5	21.6	55.5	27.8	56.9	28.4
29	66.0	20.4	56.9	27.2	* 56.5	28.4
30	64.2	22.6	59.0	23.7	* 56.1	* 28.0
31	60.5	24.8	59.0	24.3	0.0	0.0
MEANS	60.4	23.9	62.6	25.1	58.0	27.2
OBSVNS.	30	30	31	31	25	26
MAXIMUM	66.0	27.6	67.3	27.8	62.5	29.8
MINIMUM	55.0	15.2	55.5	21.4	52.5	24.6
STD.DEV.	2.73	2.86	2.97	1.53	2.44	1.53

ENTRANCE ISLAND 49 12 34 N 123 48 27 W

	OCTOBER		NOVEMBER		DECEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	55.8	27.6	49.2	26.8	46.1	27.7
2	55.5	27.7	48.8	26.8	45.2	25.8
3	55.3	27.7	48.0	27.6	46.2	28.8
4	55.0	27.7	47.5	28.9	44.6	26.8
5	54.0	28.0	47.8	29.0	45.5	27.8
6	52.8	28.2	47.8	29.0	47.2	29.3
7	53.8	27.3	47.6	28.9	47.2	29.3
8	53.0	28.1	46.6	27.7	43.0	22.9
9	54.5	27.4	45.4	25.6	43.9	25.2
10	52.0	28.2	46.1	26.1	44.6	26.8
11	51.4	28.6	47.5	27.7	46.0	28.2
12	51.3	28.5	47.5	27.8	46.7	29.3
13	50.1	29.0	47.3	28.9	46.0	29.4
14	49.9	28.8	47.6	29.4	46.1	29.0
15	50.7	28.0	47.8	29.1	47.0	29.5
16	51.6	27.8	47.3	29.1	45.9	26.1
17	51.0	28.5	45.2	26.3	45.8	28.0
18	50.9	28.0	45.4	27.4	44.0	23.9
19	50.0	29.4	45.2	27.3	45.0	26.9
20	50.6	28.6	46.5	28.9	46.4	28.8
21	51.5	27.8	46.4	28.9	45.8	27.4
22	51.0	28.1	45.4	27.8	45.0	25.8
23	51.5	26.7	46.0	28.1	45.2	27.1
24	* 50.9	* 27.4	45.3	28.1	45.7	28.1
25	50.3	28.1	46.0	28.8	45.0	26.4
26	49.4	29.0	44.9	28.0	45.0	28.1
27	49.4	29.1	46.7	28.9	43.8	26.9
28	49.1	29.5	46.0	29.0	43.2	25.9
29	49.6	28.0	46.2	29.0	43.8	26.9
30	49.8	27.6	46.0	28.8	43.4	28.1
31	49.4	25.9	0.0	0.0	43.2	26.8
MEANS	51.7	28.1	46.7	28.1	45.2	27.3
OBSVNS.	30	30	30	30	31	31
YRLY.MEANS....................................					51.1	26.9
MAXIMUM	55.8	29.5	49.2	29.4	47.2	29.5
MINIMUM	49.1	25.9	44.9	25.6	43.0	22.9
STD.DEV.	2.04	.76	1.14	1.03	1.22	1.61

DEPARTURE BAY 49 12 38 N 123 57 17 W

	JANUARY		FEBRUARY		MARCH	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	42.0	25.1	42.5	26.4	45.0	23.7
2	41.0	27.4	42.5	26.8	44.5	24.6
3	41.5	27.8	43.0	29.0	44.5	27.1
4	40.5	28.0	42.5	29.5	43.0	24.0
5	43.8	28.9	41.5	29.5	43.5	25.8
6	42.5	29.5	37.5	28.1	44.0	26.8
7	42.0	29.3	36.0	28.1	44.0	26.4
8	42.0	29.1	42.0	28.1	44.0	26.4
9	41.0	28.6	42.0	27.8	44.0	26.4
10	41.0	26.9	42.0	27.4	45.0	26.5
11	41.0	25.5	41.0	28.4	45.0	26.3
12	41.0	25.9	41.5	28.1	45.0	28.4
13	* 0.0	25.1	41.5	28.1	45.0	28.9
14	* 0.0	25.5	43.0	28.6	45.0	28.1
15	* 0.0	17.9	43.0	28.6	45.0	27.8
16	* 0.0	17.8	42.5	27.6	45.0	29.7
17	* 0.0	17.3	43.5	29.1	44.0	29.9
18	* 0.0	22.9	43.5	29.4	44.0	29.4
19	* 0.0	28.0	43.0	28.5	44.0	25.8
20	42.0	22.9	42.0	28.6	45.0	29.7
21	42.5	28.4	42.0	28.0	45.0	28.2
22	42.0	25.0	42.0	27.3	45.0	28.1
23	42.0	25.4	42.0	27.1	44.5	28.5
24	43.5	25.9	43.0	27.3	45.0	28.0
25	41.5	28.2	43.5	27.1	45.0	28.1
26	41.0	27.6	44.0	26.1	45.0	28.4
27	41.5	26.9	44.0	25.4	45.0	28.1
28	42.5	27.7	45.0	22.9	47.0	28.5
29	42.5	27.7	0.0	0.0	46.0	28.4
30	42.5	27.7	0.0	0.0	46.0	28.4
31	42.5	26.7	0.0	0.0	46.0	28.4
MEANS	41.9	26.0	42.2	27.7	44.8	27.5
OBSVNS.	24	31	28	28	31	31
MAXIMUM	43.8	29.5	45.0	29.5	47.0	29.9
MINIMUM	40.5	17.3	36.0	22.9	43.0	23.7
STD.DEV.	.83	3.25	1.79	1.39	.80	1.60

DEPARTURE BAY 49 12 38 N 123 57 17 W

	APRIL		MAY		JUNE	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	47.0	29.3	52.5	28.5	54.0	27.6
2	47.0	29.3	51.5	28.8	54.0	26.7
3	47.0	28.8	51.0	28.5	54.0	26.7
4	47.0	29.5	48.5	29.4	55.0	26.7
5	47.0	29.0	49.5	29.7	56.0	28.0
6	47.5	29.1	52.5	27.8	55.0	26.9
7	48.0	29.4	49.0	29.3	55.0	28.0
8	48.0	29.4	48.0	28.6	55.0	28.8
9	49.0	29.7	50.0	28.6	* 56.2	* 28.1
10	50.0	29.4	53.0	26.7	57.5	27.4
11	50.2	29.8	55.0	26.7	* 58.2	* 27.0
12	50.2	29.1	55.5	26.7	59.0	26.7
13	52.0	29.0	58.0	24.7	54.5	28.4
14	49.0	29.1	58.0	24.7	54.0	28.9
15	50.5	29.1	58.0	24.7	55.0	28.6
16	* 48.2	* 29.2	57.0	25.4	53.5	28.4
17	45.8	29.4	58.0	27.6	53.0	27.7
18	45.6	29.9	55.0	28.8	54.0	29.1
19	45.8	29.7	57.0	27.4	53.0	27.6
20	44.6	29.9	58.0	26.9	54.0	28.5
21	49.0	29.4	57.0	26.7	62.0	17.9
22	49.0	29.1	55.0	28.0	64.0	15.7
23	48.0	31.2	53.0	28.8	63.0	16.3
24	48.0	28.8	50.0	29.4	57.5	22.1
25	50.0	28.6	53.0	29.3	57.0	27.6
26	50.0	28.5	53.0	29.9	63.5	19.2
27	52.0	28.4	54.0	29.0	63.0	20.6
28	52.0	28.4	57.0	26.3	62.0	21.4
29	52.0	27.3	55.0	26.7	62.0	22.2
30	52.0	27.3	55.0	27.4	62.0	20.9
31	0.0	0.0	* 54.5	* 27.5	0.0	0.0
MEANS	48.7	29.1	53.9	27.7	57.2	25.2
OBSVNS.	29	29	30	30	28	28
MAXIMUM	52.0	31.2	58.0	29.9	64.0	29.1
MINIMUM	44.6	27.3	48.0	24.7	53.0	15.7
STD.DEV.	2.14	.75	3.16	1.53	3.81	4.18

DEPARTURE BAY 49 12 38 N 123 57 17 W

	JULY		AUGUST		SEPTEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	* 61.8	* 22.9	65.0	25.1	60.0	25.0
2	61.5	25.0	65.0	25.5	61.0	25.8
3	62.0	27.1	65.5	25.9	60.0	26.9
4	58.0	25.9	64.5	24.7	62.0	26.1
5	58.0	24.6	63.5	26.1	64.0	26.4
6	57.0	22.2	64.5	26.3	61.0	26.1
7	57.5	23.8	66.5	26.5	57.0	29.8
8	56.5	26.1	68.0	25.4	58.5	29.5
9	59.0	25.5	68.0	22.2	59.0	29.1
10	59.5	23.8	67.0	22.4	61.0	27.6
11	62.0	16.5	66.5	24.6	62.0	27.3
12	64.5	16.0	67.0	26.0	63.0	27.4
13	64.5	20.0	67.0	26.3	* 62.0	* 27.3
14	63.0	27.1	65.0	25.9	61.0	27.2
15	63.0	25.1	64.5	26.8	62.0	27.2
16	61.5	25.1	63.0	26.3	60.5	27.2
17	62.0	25.4	59.0	27.7	60.0	29.0
18	62.0	25.8	58.0	27.8	59.0	28.2
19	64.0	26.7	* 0.0	28.2	58.0	28.0
20	62.5	26.1	* 0.0	25.1	55.0	29.0
21	58.0	26.0	* 0.0	26.5	53.0	29.7
22	58.0	27.1	62.0	26.4	52.5	29.8
23	58.5	26.8	61.5	26.8	55.0	29.3
24	59.0	27.2	61.0	26.7	55.0	29.1
25	60.0	24.6	62.0	26.9	57.5	28.2
26	63.0	20.8	61.5	26.9	57.0	27.4
27	65.2	21.2	60.0	26.7	56.0	27.8
28	65.4	20.6	58.5	25.4	54.0	28.2
29	65.2	21.7	58.0	25.4	57.0	29.9
30	67.0	22.2	58.0	26.4	53.5	27.8
31	66.5	23.7	* 59.0	* 25.7	0.0	0.0
MEANS	61.5	24.0	63.3	26.0	58.4	27.9
OBSVNS.	30	30	27	30	29	29
MAXIMUM	67.0	27.2	68.0	28.2	64.0	29.9
MINIMUM	56.5	16.0	58.0	22.2	52.5	25.0
STD.DEV.	3.04	2.99	3.26	1.31	3.20	1.33

DEPARTURE BAY 49 12 38 N 123 57 17 W

	OCTOBER		NOVEMBER		DECEMBER	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	53.5	27.8	48.0	26.7	46.4	26.7
2	55.0	28.0	48.0	27.2	46.4	27.4
3	55.5	28.4	48.0	27.7	46.0	24.6
4	55.0	28.0	48.0	27.6	44.0	24.3
5	54.0	29.1	45.0	27.7	43.5	23.9
6	54.0	28.8	45.5	28.1	45.0	22.5
7	54.0	28.0	46.0	27.8	44.5	20.4
8	53.0	28.1	46.5	28.9	43.0	19.9
9	53.0	28.9	44.0	27.3	45.0	23.3
10	53.0	28.8	46.0	26.9	40.0	22.6
11	52.5	28.6	46.0	24.3	43.0	21.3
12	51.0	28.6	46.0	28.0	45.0	23.1
13	50.5	29.1	46.0	24.3	44.0	19.1
14	51.0	29.1	44.5	23.1	44.0	20.9
15	51.0	28.4	45.5	26.1	45.0	22.6
16	50.5	28.9	47.0	29.0	45.0	26.1
17	50.5	28.9	45.5	28.0	45.5	26.1
18	51.0	28.6	44.5	27.1	45.5	26.4
19	51.0	28.1	44.0	27.2	46.0	23.1
20	51.0	28.6	46.0	28.2	* 45.0	* 24.0
21	51.5	27.2	47.0	28.6	44.0	25.0
22	52.0	27.8	45.0	28.4	44.5	25.5
23	51.5	26.1	42.5	25.4	44.0	24.0
24	50.5	27.2	45.5	26.7	44.5	23.4
25	48.5	28.5	45.0	28.6	41.5	25.8
26	49.5	28.0	43.5	27.3	42.5	25.4
27	49.5	27.8	45.0	28.1	43.5	27.7
28	50.0	28.8	46.0	27.8	43.0	26.7
29	50.0	27.7	* 46.1	22.4	43.0	26.8
30	49.0	27.4	* 46.3	22.9	42.0	27.4
31	48.5	25.8	0.0	0.0	42.0	26.8
MEANS	51.6	28.2	45.7	26.9	44.0	24.3
OBSVNS.	31	31	28	30	30	30
YRLY.MEANS..					51.2	26.7
MAXIMUM	55.5	29.1	48.0	29.0	46.4	27.7
MINIMUM	48.5	25.8	42.5	22.4	40.0	19.1
STD.DEV.	1.94	.81	1.38	1.81	1.52	2.40

ACTIVE PASS 48 52 26 N 123 17 23 W

	JANUARY		FEBRUARY		MARCH	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	44.8	28.4	43.6	28.2	45.6	29.4
2	44.2	28.1	42.8	28.2	45.2	29.4
3	42.7	28.5	42.1	26.5	45.5	29.8
4	42.7	28.5	43.3	28.2	45.6	30.0
5	41.2	28.2	42.0	26.8	45.4	29.4
6	41.4	28.5	41.2	27.2	45.4	28.8
7	42.1	28.5	41.7	28.1	45.4	27.3
8	41.2	29.0	41.2	26.8	44.3	26.0
9	40.6	28.5	41.3	28.4	44.2	26.7
10	40.2	27.1	41.2	26.3	44.5	27.8
11	43.0	28.6	41.7	26.8	44.7	28.2
12	44.2	28.5	41.8	26.9	44.3	28.4
13	44.8	29.3	42.4	27.6	44.7	26.5
14	45.0	29.3	42.8	27.6	45.2	27.7
15	45.7	30.0	43.1	28.5	45.5	28.6
16	45.2	29.9	43.7	28.5	45.2	28.9
17	45.2	29.9	44.2	28.2	45.7	28.8
18	44.7	29.5	43.6	28.0	46.1	29.9
19	44.7	29.7	43.2	27.1	45.8	29.3
20	44.7	29.9	42.9	26.7	45.8	29.7
21	43.7	29.5	42.7	26.7	44.5	29.4
22	43.9	29.5	42.8	28.8	44.8	29.1
23	43.8	29.7	43.2	28.6	44.6	28.4
24	45.3	30.4	43.3	27.2	45.9	28.9
25	42.6	29.5	44.7	25.9	45.2	25.4
26	42.2	28.1	43.2	28.4	45.7	26.1
27	42.8	28.5	44.7	28.6	46.2	26.9
28	42.8	27.8	45.0	28.9	46.6	26.0
29	42.3	27.7	0.0	0.0	44.7	28.8
30	43.0	27.8	0.0	0.0	46.3	28.8
31	43.2	27.8	0.0	0.0	46.2	28.5
MEANS	43.4	28.8	42.8	27.6	45.3	28.3
OBSVNS.	31	31	28	28	31	31
MAXIMUM	45.7	30.4	45.0	28.9	46.6	30.0
MINIMUM	40.2	27.1	41.2	25.9	44.2	25.4
STD.DEV.	1.50	.84	1.09	.87	.65	1.31

ACTIVE PASS 48 52 26 N 123 17 23 W

	APRIL		MAY		JUNE		1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL	
1	48.2	27.6	48.7	29.9	53.6	27.4	
2	47.8	28.1	48.3	29.5	51.7	29.1	
3	46.9	29.0	48.2	30.7	52.2	29.5	
4	47.3	28.8	49.6	30.0	51.7	28.5	
5	47.2	28.1	48.2	29.7	52.7	28.8	
6	46.3	25.0	48.3	30.3	51.2	28.8	
7	45.8	27.8	48.0	29.5	51.8	28.8	
8	47.2	28.6	48.6	29.8	52.6	29.9	
9	47.2	28.4	48.7	29.3	54.4	29.3	
10	47.7	27.8	50.5	26.0	58.8	10.7	
11	47.8	29.0	51.2	27.4	54.2	27.3	
12	50.6	28.0	51.6	28.9	53.8	28.9	
13	50.0	26.0	49.7	29.3	52.4	29.4	
14	49.1	29.1	51.6	27.2	51.7	29.3	
15	48.7	28.9	49.8	29.8	50.6	29.7	
16	47.5	28.9	49.1	30.6	50.6	29.7	
17	47.6	29.1	50.3	30.3	51.8	27.6	
18	46.8	29.1	51.9	28.1	49.5	29.4	
19	48.0	29.7	50.7	28.5	50.8	29.7	
20	49.1	29.7	51.5	28.8	55.0	23.0	
21	48.2	26.9	51.2	28.1	55.3	25.5	
22	47.5	28.9	51.7	29.1	60.1	12.2	
23	47.8	28.2	49.7	29.4	58.2	18.8	
24	47.7	24.4	47.8	30.3	51.0	29.5	
25	48.0	28.4	51.8	23.5	55.2	27.3	
26	48.1	28.8	51.0	25.9	56.7	27.6	
27	49.0	26.0	51.2	28.6	54.8	29.3	
28	50.8	26.7	56.1	8.4	62.2	15.4	
29	49.7	29.4	53.8	25.0	61.8	12.0	
30	49.2	29.3	57.7	12.9	60.2	19.9	
31	0.0	0.0	54.5	25.8	0.0	0.0	
MEANS	48.1	28.1	50.7	27.4	54.2	25.7	
OBSVNS.	30	30	31	31	30	30	
MAXIMUM	50.8	29.7	57.7	30.7	62.2	29.9	
MINIMUM	45.8	24.4	47.8	8.4	49.5	10.7	
STD.DEV.	1.18	1.34	2.37	4.85	3.53	5.94	

ACTIVE PASS 48 52 26 N 123 17 23 W

	JULY		AUGUST		SEPTEMBER 1973	
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	55.2	27.3	56.3	28.8	54.6	26.7
2	54.2	28.4	61.1	23.5	56.7	26.8
3	53.3	28.6	58.8	26.7	58.2	17.1
4	53.1	28.2	58.2	27.4	59.3	23.5
5	53.2	27.6	59.2	23.0	61.7	24.2
6	52.7	28.4	59.0	27.2	54.6	28.0
7	53.1	28.5	57.5	27.3	59.1	27.3
8	54.2	28.9	56.8	29.1	54.1	28.1
9	53.5	29.3	68.5	26.0	57.2	28.0
10	55.0	29.0	61.8	26.9	58.2	26.3
11	55.3	27.7	65.8	16.5	54.2	28.0
12	62.2	14.9	66.2	20.3	59.6	25.0
13	64.7	18.0	64.2	25.8	58.2	26.1
14	64.2	19.9	58.7	28.4	57.3	27.8
15	63.7	20.3	60.3	27.2	56.1	28.0
16	61.8	25.0	56.8	28.8	56.7	27.3
17	59.4	26.8	55.8	28.5	55.2	28.0
18	59.4	26.4	57.1	27.8	55.0	29.3
19	58.3	27.1	57.7	25.6	51.6	29.9
20	56.5	27.6	56.2	27.6	51.8	30.0
21	56.7	27.7	55.9	27.3	51.7	30.3
22	55.2	27.2	54.7	28.4	52.7	29.9
23	54.9	28.4	54.2	28.2	53.7	27.8
24	54.3	28.1	52.7	29.8	52.2	30.2
25	54.2	27.6	56.8	28.6	54.7	26.8
26	63.2	16.3	55.2	29.0	52.3	29.3
27	64.8	15.3	52.7	30.0	53.3	28.4
28	59.2	26.3	52.0	29.4	52.3	28.6
29	57.4	26.9	54.0	29.1	50.8	29.7
30	54.5	28.4	53.3	28.5	51.0	27.8
31	53.8	30.0	58.2	24.0	0.0	0.0
MEANS	57.1	25.8	57.9	26.9	55.1	27.5
OBSVNS.	31	31	31	31	30	30
MAXIMUM	64.8	30.0	68.5	30.0	61.7	30.3
MINIMUM	52.7	14.9	52.0	16.5	50.8	17.1
STD.DEV.	3.99	4.38	4.06	2.90	2.93	2.59

ACTIVE PASS 48 52 26 N 123 17 23 W

	OCTOBER		NOVEMBER		DECEMBER	1973
DATE	TEMP	SAL	TEMP	SAL	TEMP	SAL
1	52.7	27.2	47.7	23.9	44.1	25.5
2	51.6	28.2	48.2	27.1	45.6	28.0
3	51.8	28.2	47.8	28.5	46.0	28.8
4	52.3	28.1	45.9	29.1	44.9	28.5
5	52.3	28.8	46.8	29.0	45.3	28.5
6	52.7	21.3	46.8	29.4	47.4	29.7
7	53.1	27.6	47.0	29.4	47.1	29.7
8	52.9	28.5	46.8	28.9	45.2	28.0
9	51.2	29.0	44.5	24.2	42.9	22.5
10	50.7	28.9	46.3	25.1	45.2	26.7
11	50.8	29.0	47.6	26.7	46.3	29.7
12	50.3	29.0	47.3	27.7	46.8	30.4
13	50.7	29.4	47.4	29.4	46.0	30.2
14	49.0	28.9	46.9	29.0	46.2	30.7
15	49.6	25.5	47.8	29.7	47.1	30.3
16	49.2	29.3	47.8	29.5	46.8	30.6
17	50.2	26.5	45.2	25.4	45.6	27.7
18	50.7	26.7	43.6	23.7	45.3	28.1
19	50.0	29.1	44.7	26.5	45.2	28.1
20	50.8	28.4	47.1	28.9	46.3	29.3
21	50.4	28.1	45.8	28.5	45.2	27.3
22	50.7	28.0	45.6	27.4	45.7	29.0
23	50.1	27.1	44.7	28.4	45.7	28.8
24	49.6	29.1	45.1	26.9	45.9	29.7
25	49.7	29.0	45.3	27.6	44.8	28.5
26	49.2	29.4	44.7	28.1	44.7	28.4
27	49.2	29.8	45.0	28.2	43.8	26.7
28	49.0	29.3	46.7	29.5	44.6	29.1
29	48.8	28.6	46.3	29.3	* 43.4	* 27.2
30	48.7	29.0	46.3	29.8	42.3	25.2
31	46.6	21.7	0.0	0.0	42.3	27.7
MEANS	50.5	28.0	46.3	27.8	45.3	28.4
OBSVNS.	31	31	30	30	30	30
YRLY.MEANS....................................					49.8	27.5
MAXIMUM	53.1	29.8	48.2	29.8	47.4	30.7
MINIMUM	46.6	21.3	43.6	23.7	42.3	22.5
STD.DEV.	1.48	1.98	1.22	1.80	1.30	1.78

Annual Graphs of the 7-day

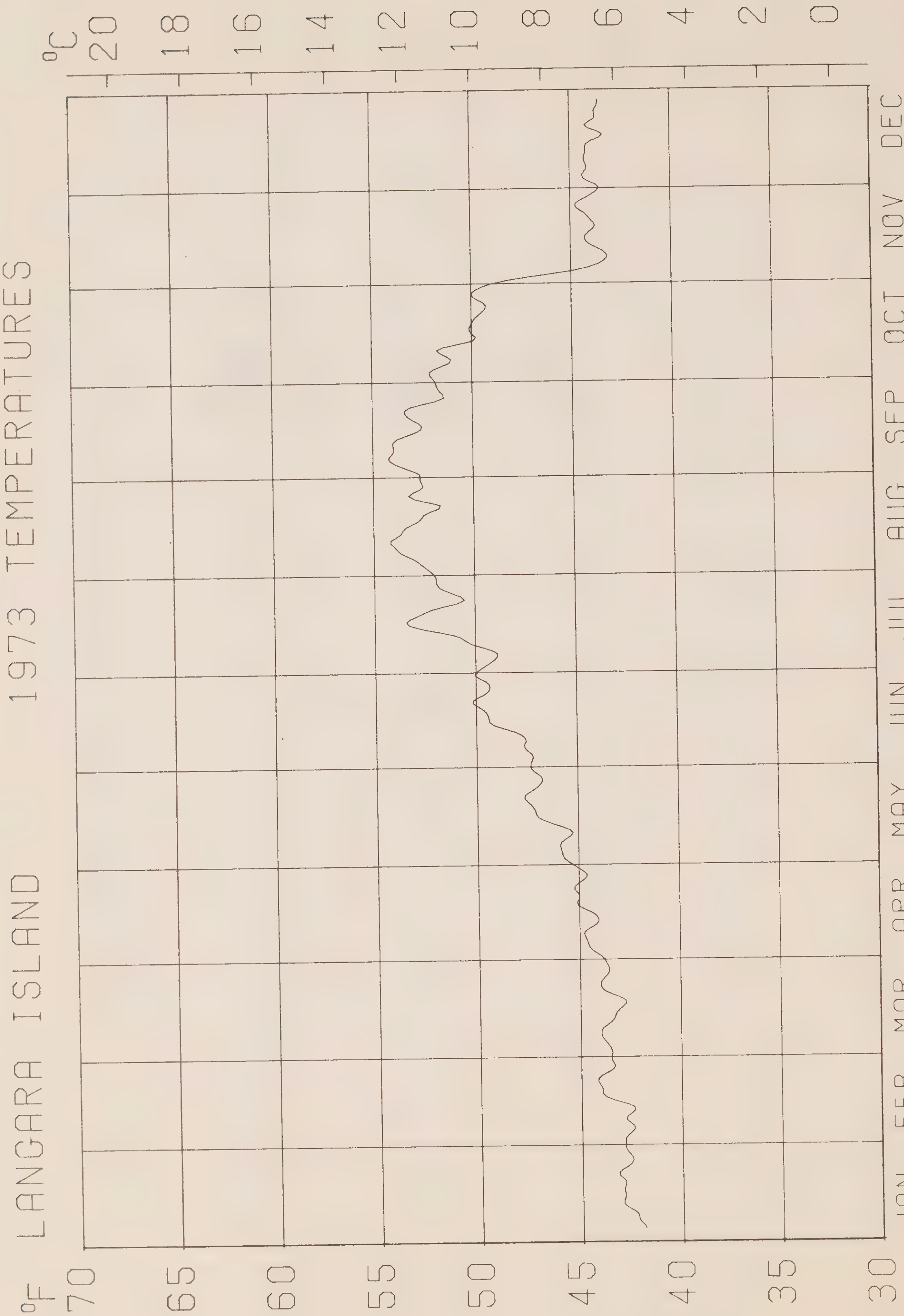
normally-weighted running means

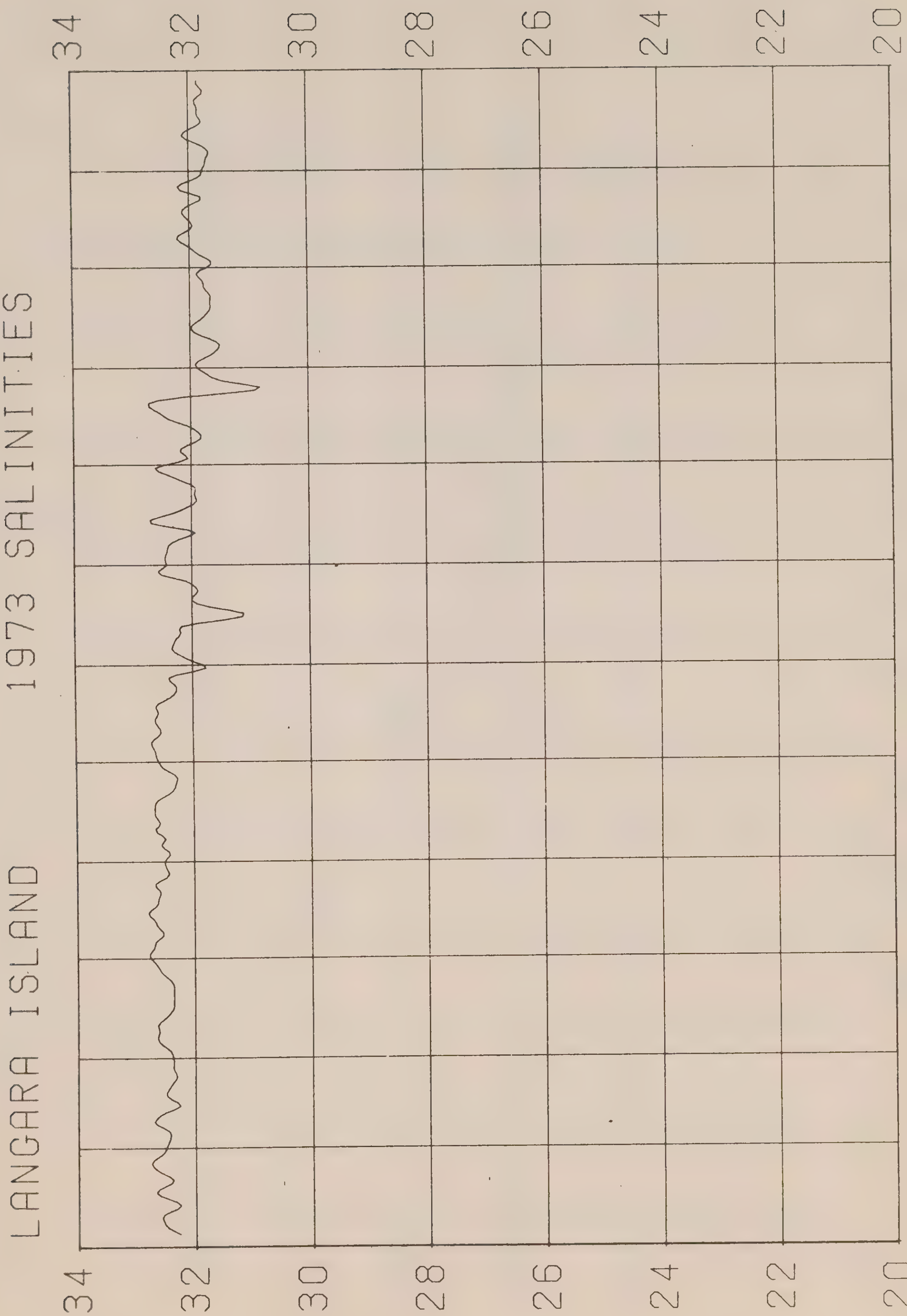
1973

Temperature

and

Salinity


LANGARA ISLAND 1973 TEMPERATURES
°F
70
65
60
55
50
45
40
35
30
°C
20
18
16
14
12
10
8
6
4
2
0
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC


LANGARA ISLAND 1973 SALINITIES
34
32
30
28
26
24
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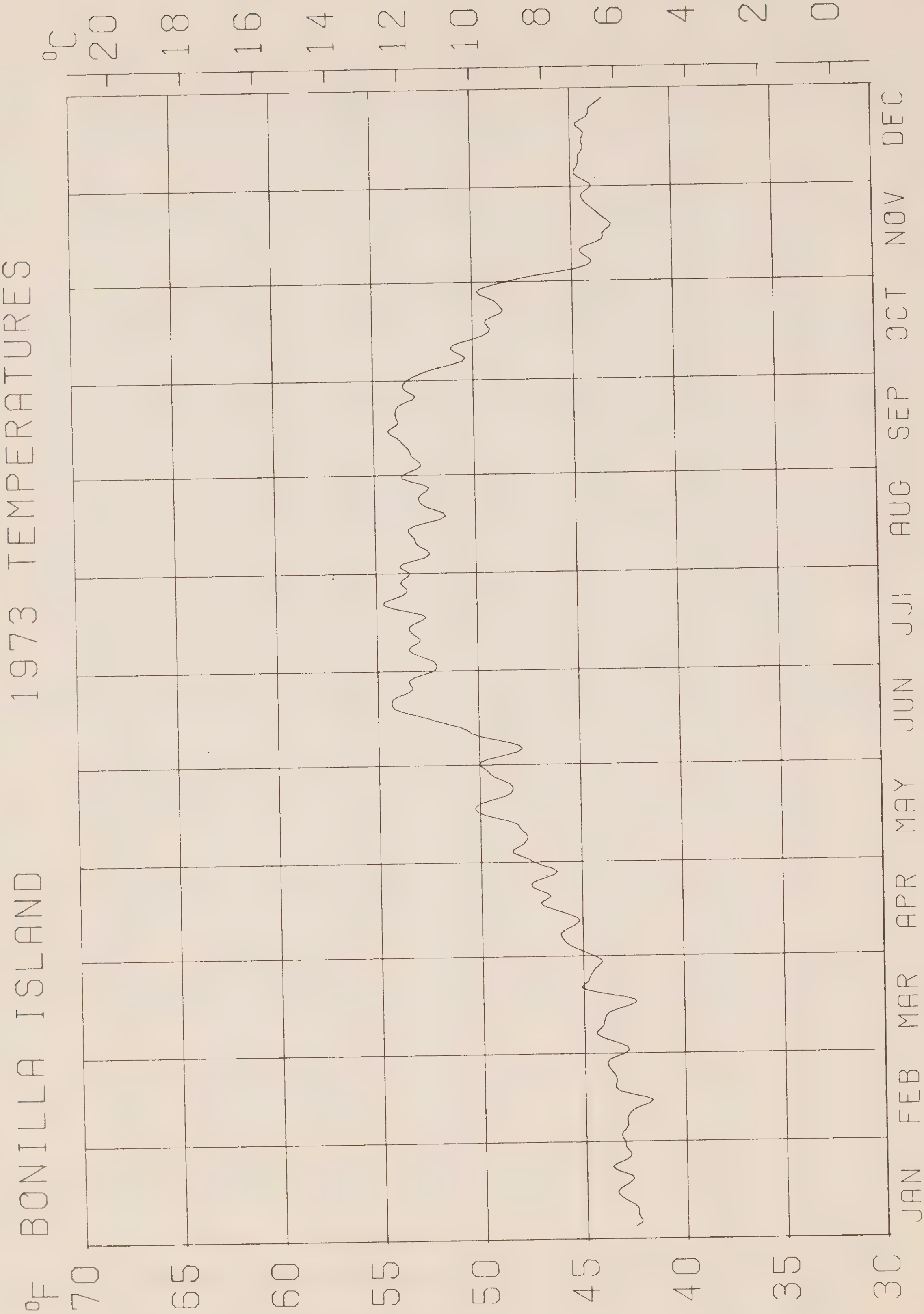
20
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC


BONILLA ISLAND
1973 TEMPERATURES
°F
70
65
60
55
50
45
40
35
30
°C
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14
12
10
8
6
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JAN
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MAY
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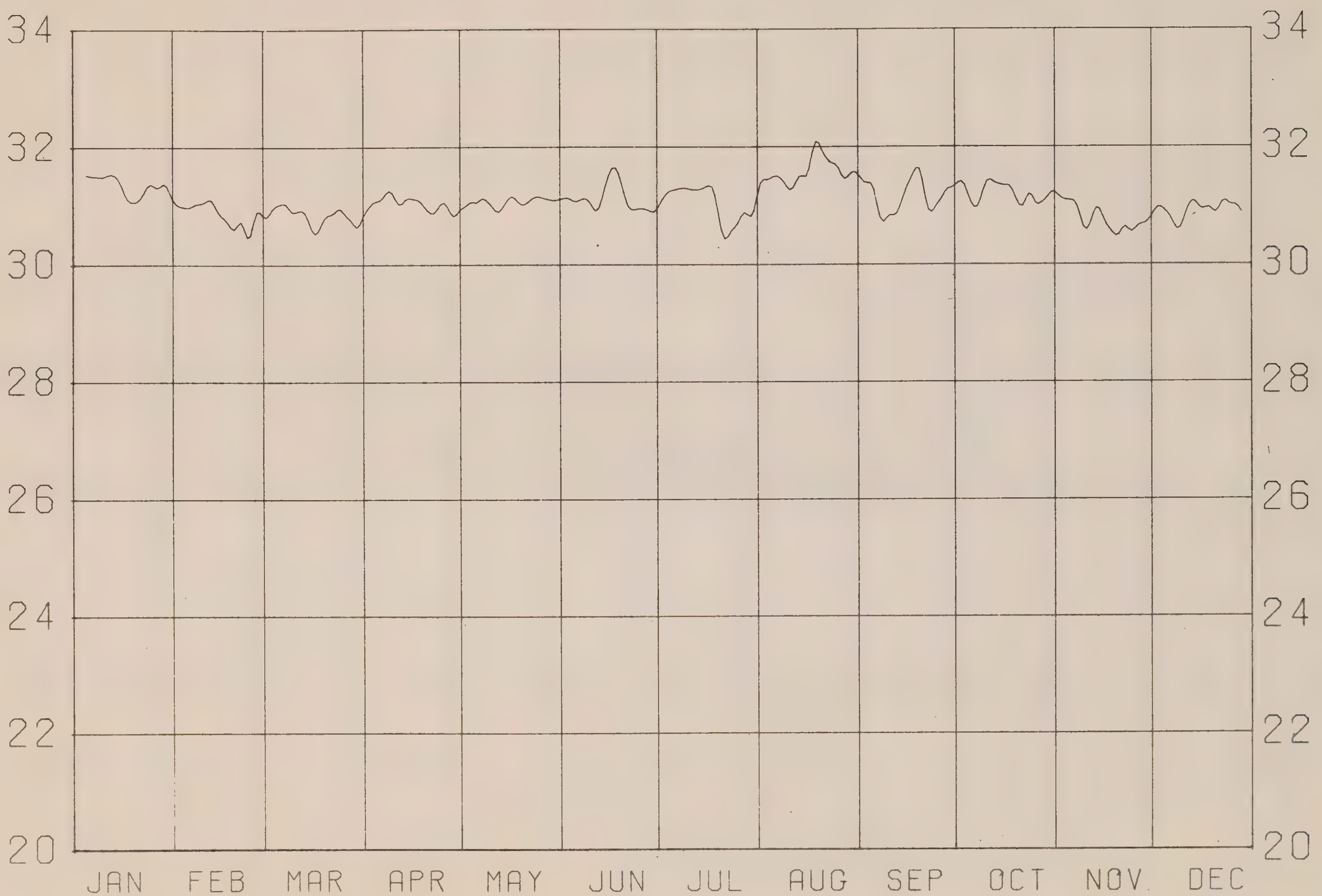
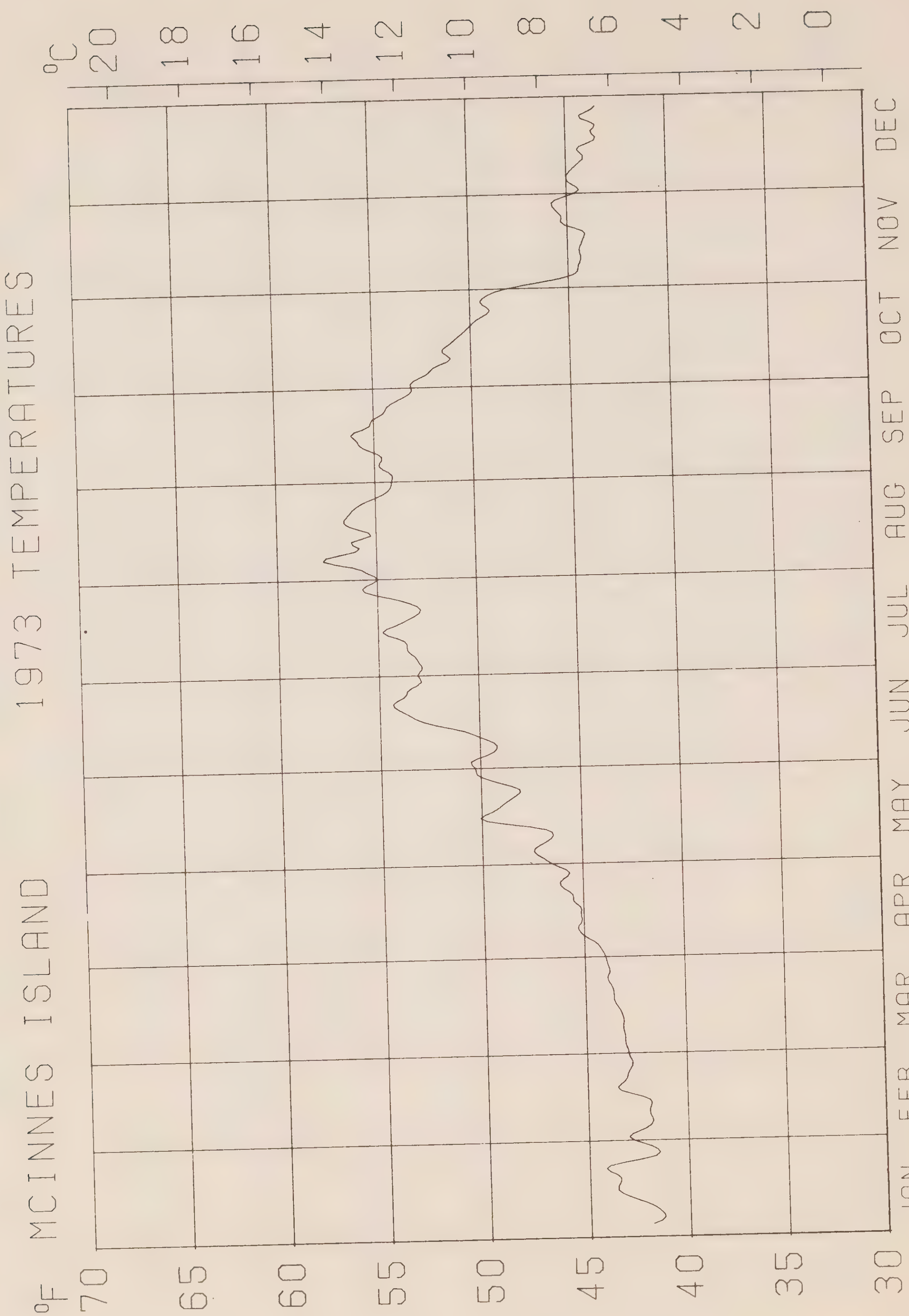
JUL
AUG
SEP
OCT
NOV
DEC

BONILLA ISLAND 1973 SALINITIES





MCINNES ISLAND 1973 TEMPERATURES
°F
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65
60
55
50
45
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35
30
°C
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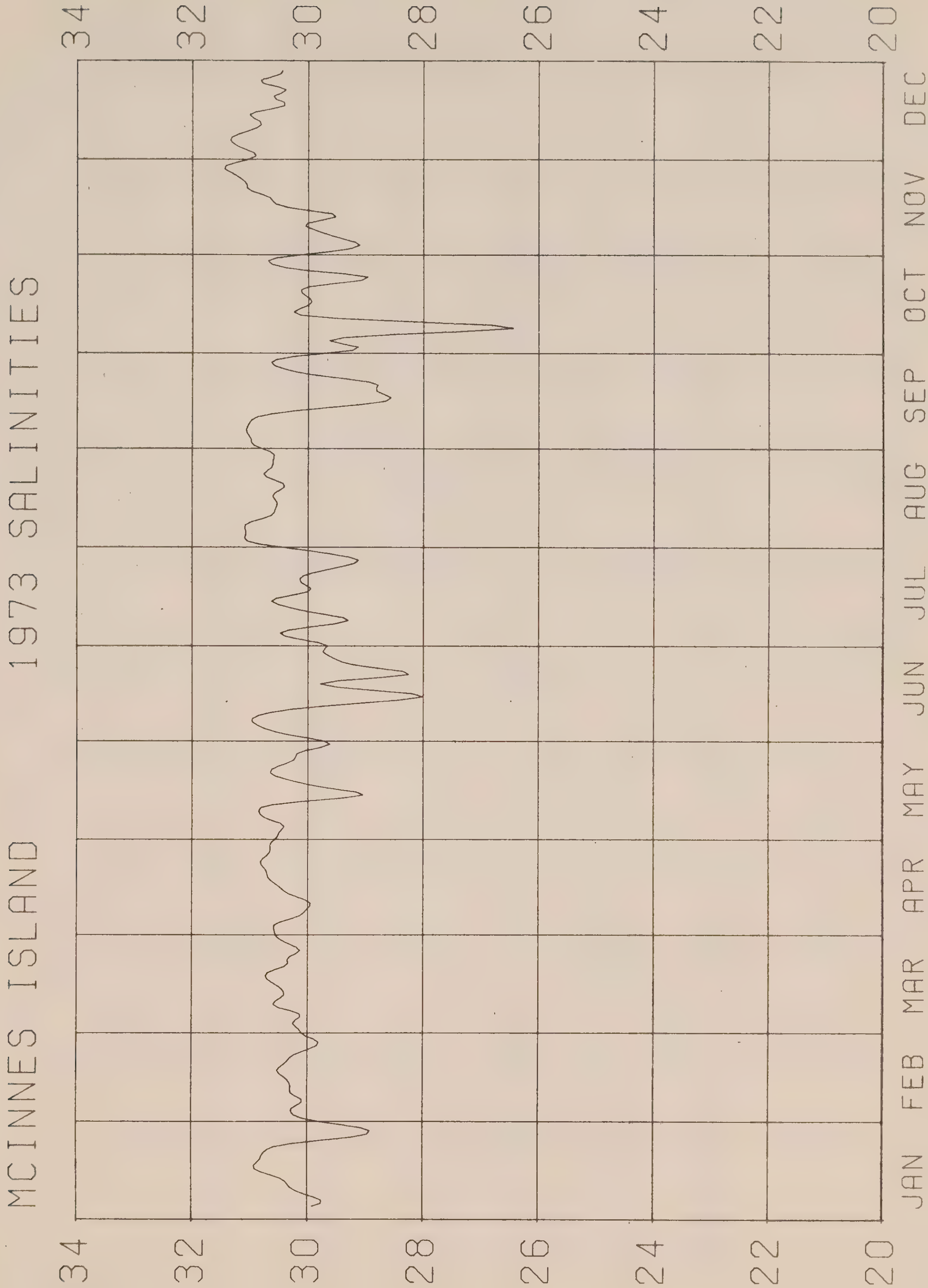
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC


MCINNES ISLAND 1973 SALINITIES
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JAN
FEB
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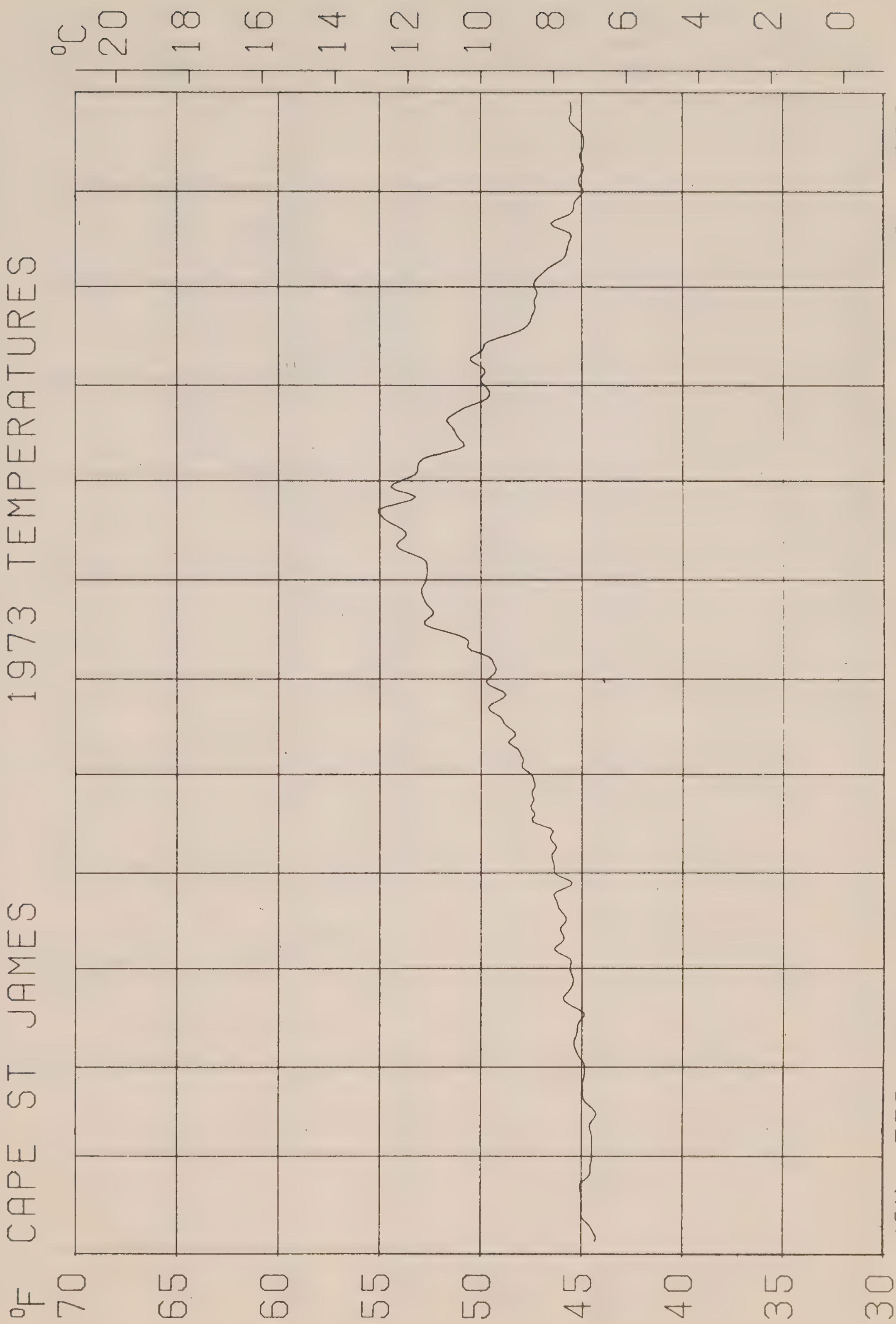
JUL
AUG
SEP
OCT
NOV
DEC


CAPE ST JAMES 1973 TEMPERATURES
°C
20
18
16
14
12
10
8
6
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0
°F
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65
60
55
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JAN
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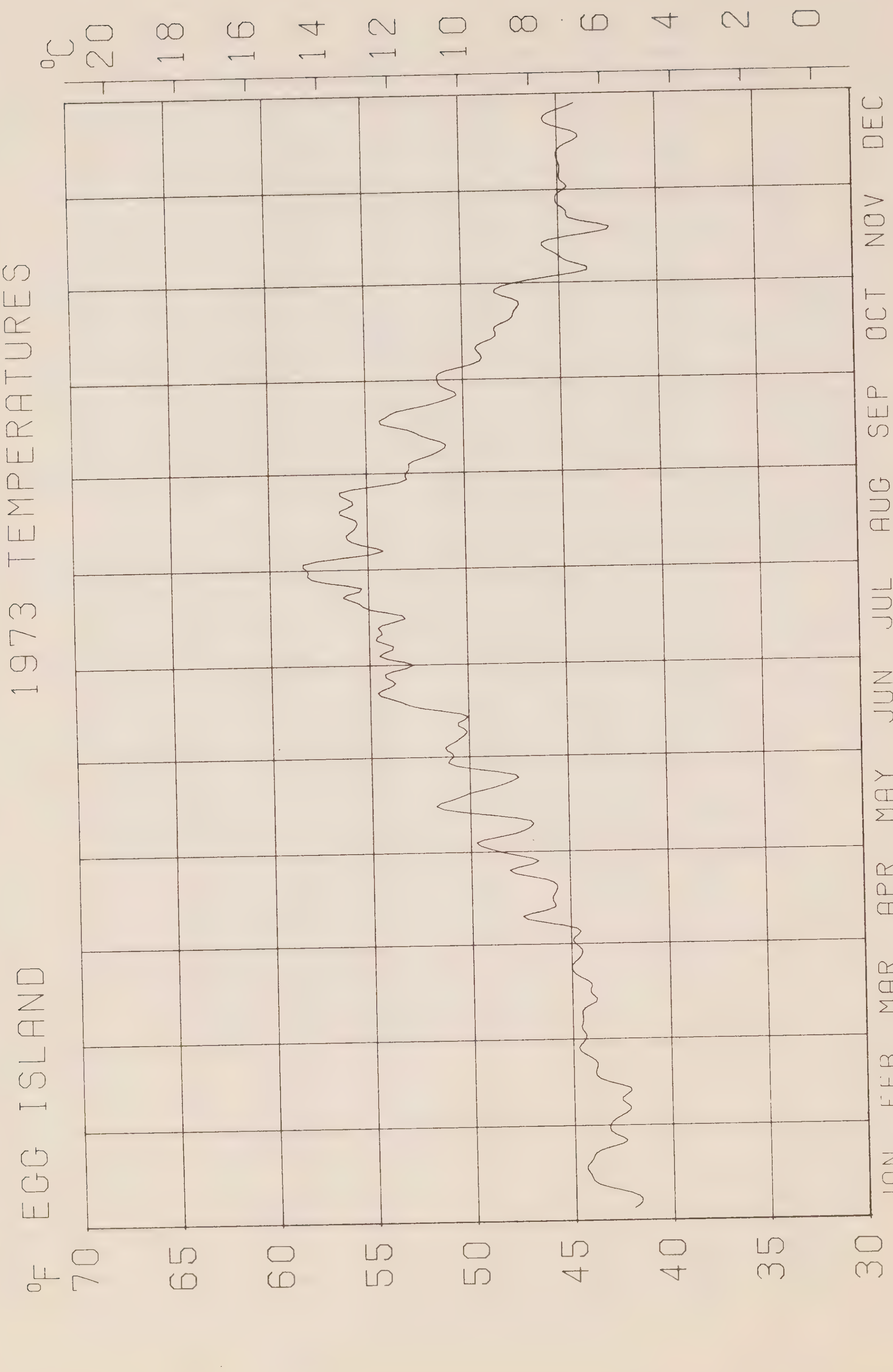
NOV
DEC


EGG ISLAND
1973 TEMPERATURES
°F
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°C
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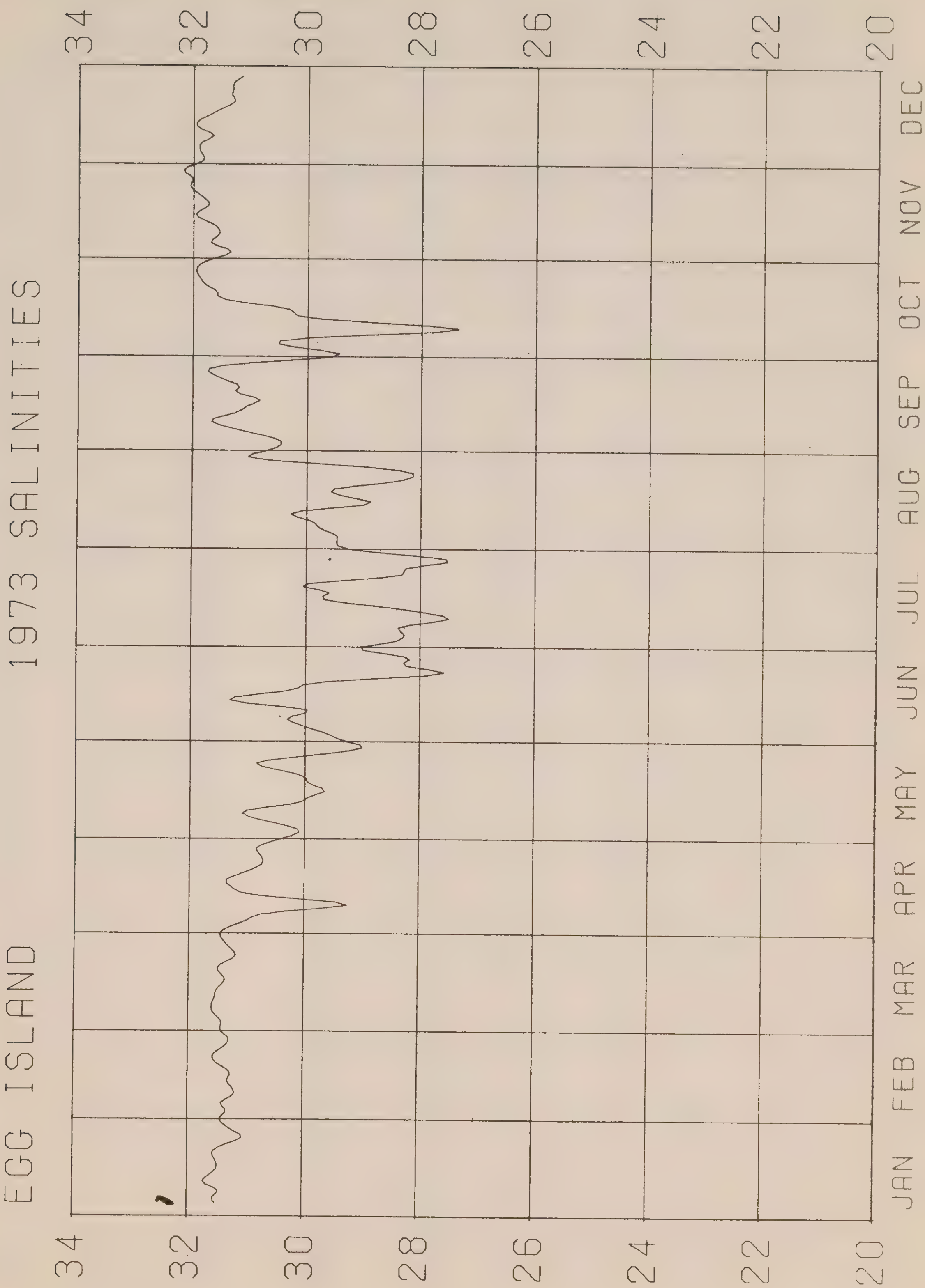
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC


EGG ISLAND
1973 SALINITIES
34
32
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JAN
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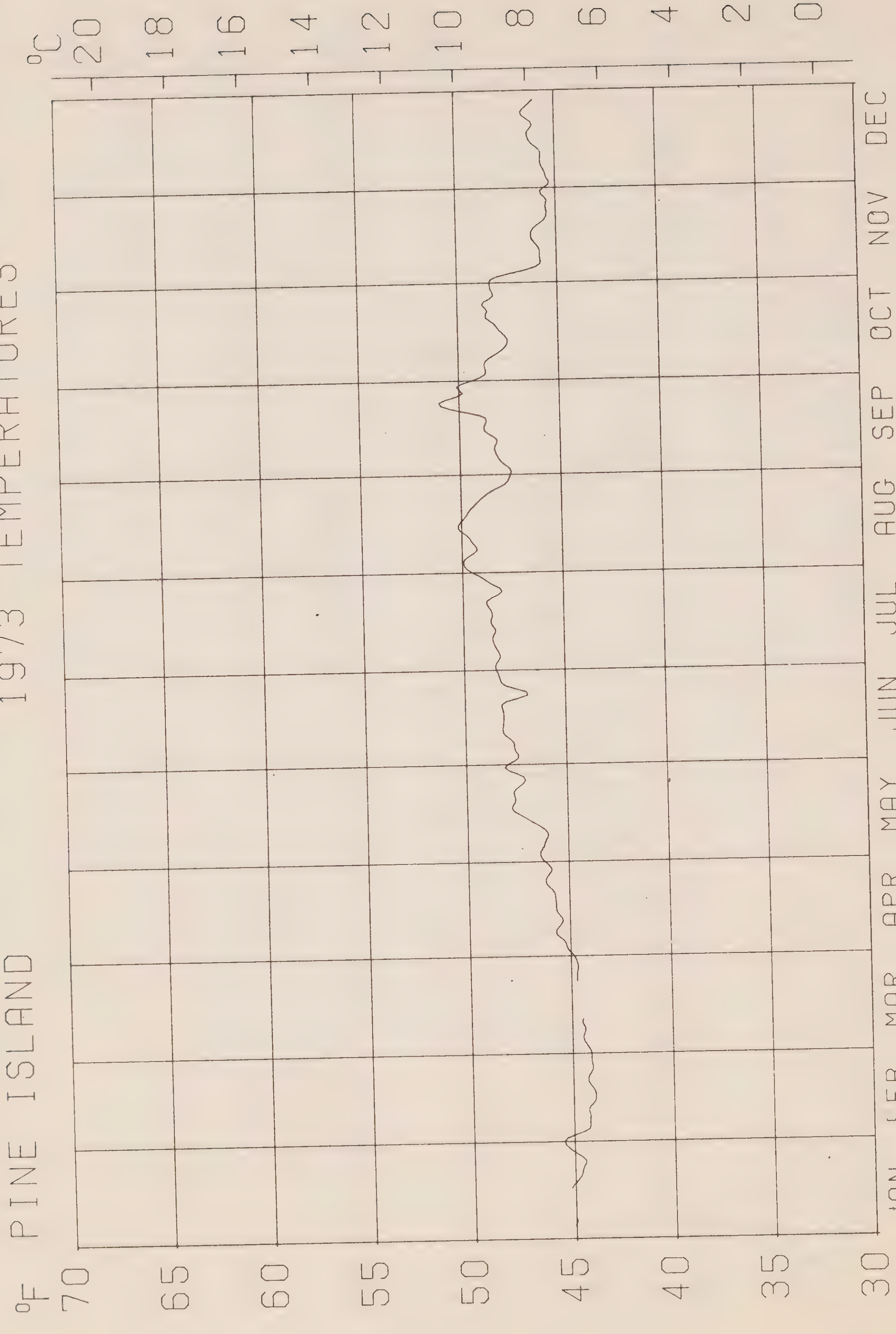
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC


PINE ISLAND 1973 TEMPERATURES
°F
70
65
60
55
50
45
40
35
30
°C
20
18
16
14
12
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JAN
FEB
MAR
APR
MAY
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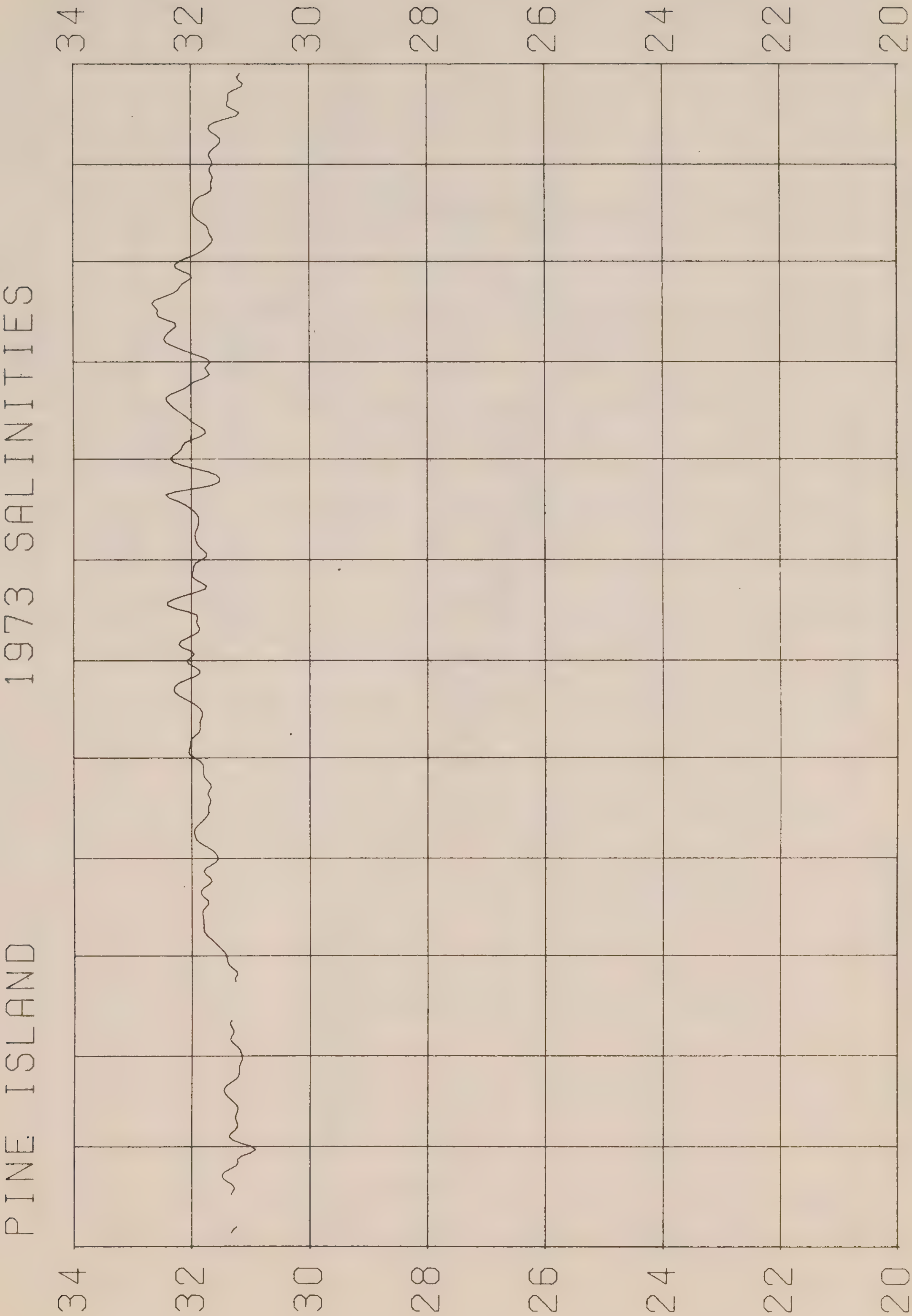
JUL
AUG
SEP
OCT
NOV
DEC


PINE ISLAND 1973 SALINITIES
34
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JAN
FEB
MAR
APR
MAY
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JUL
AUG
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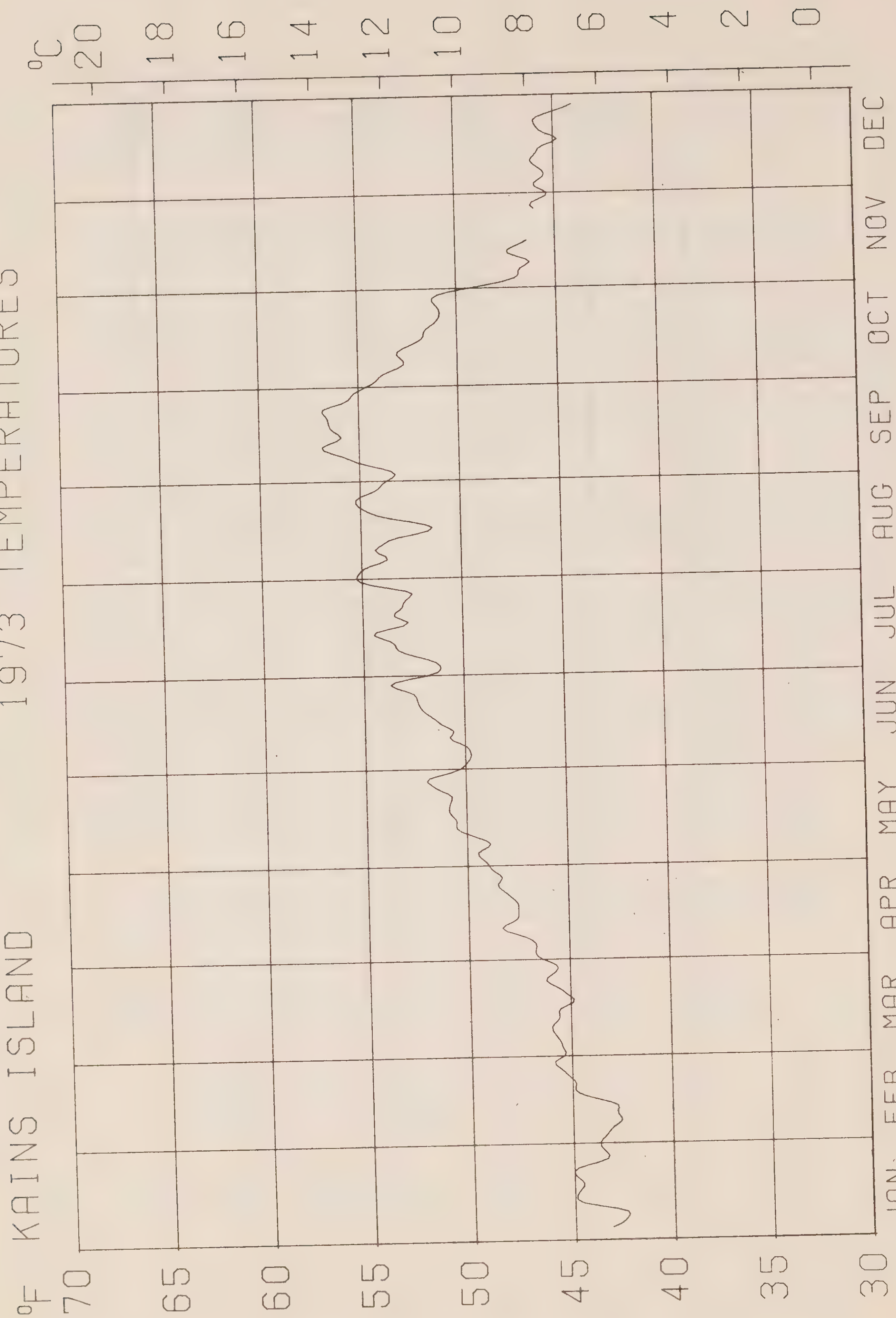
OCT
NOV
DEC



KAINS ISLAND
1973 TEMPERATURES
°F
70
65
60
55
50
45
40
35
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°C
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18
16
14
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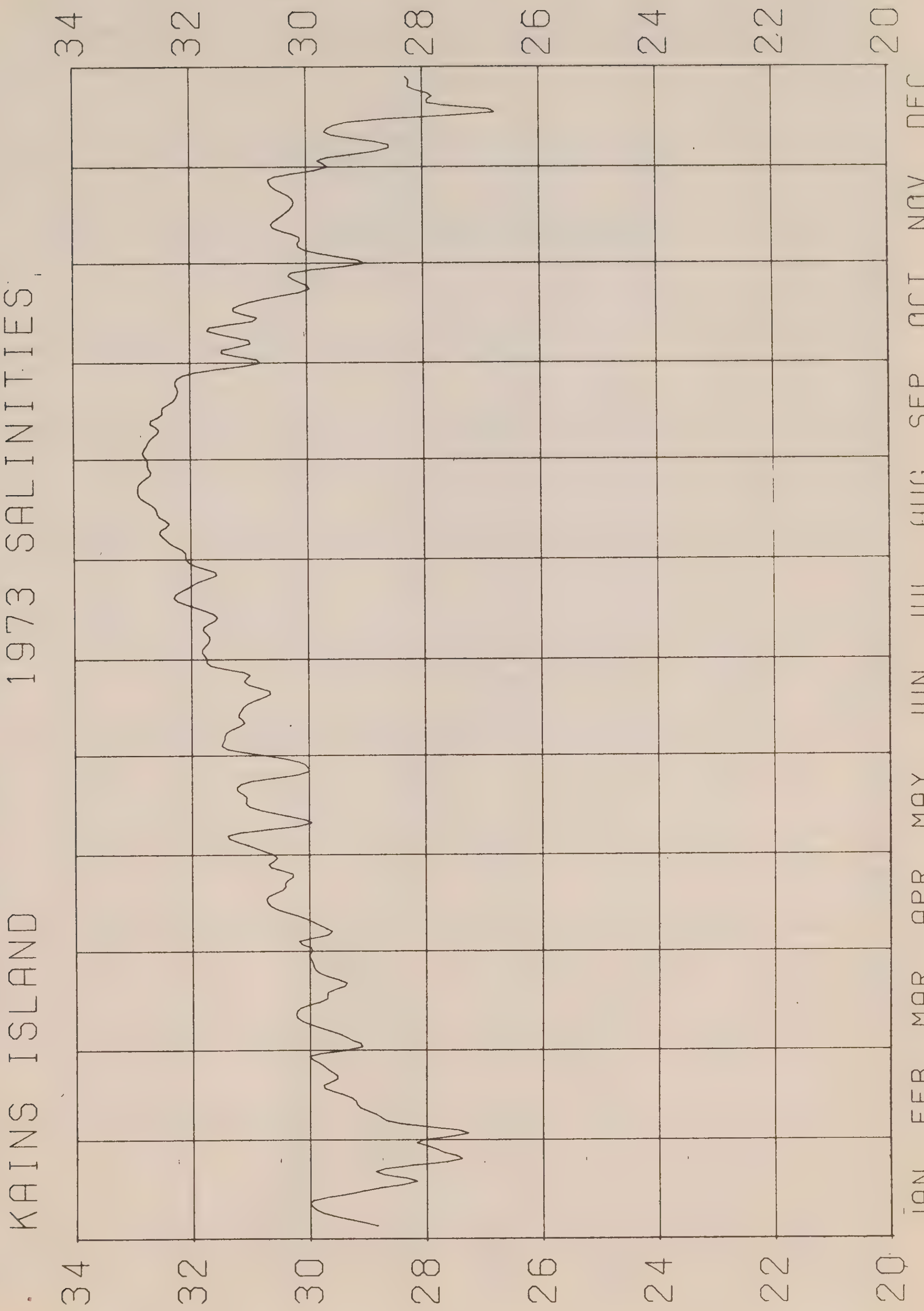
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC


KAINS ISLAND 1973 SALINITIES
34
32
30
28
26
24
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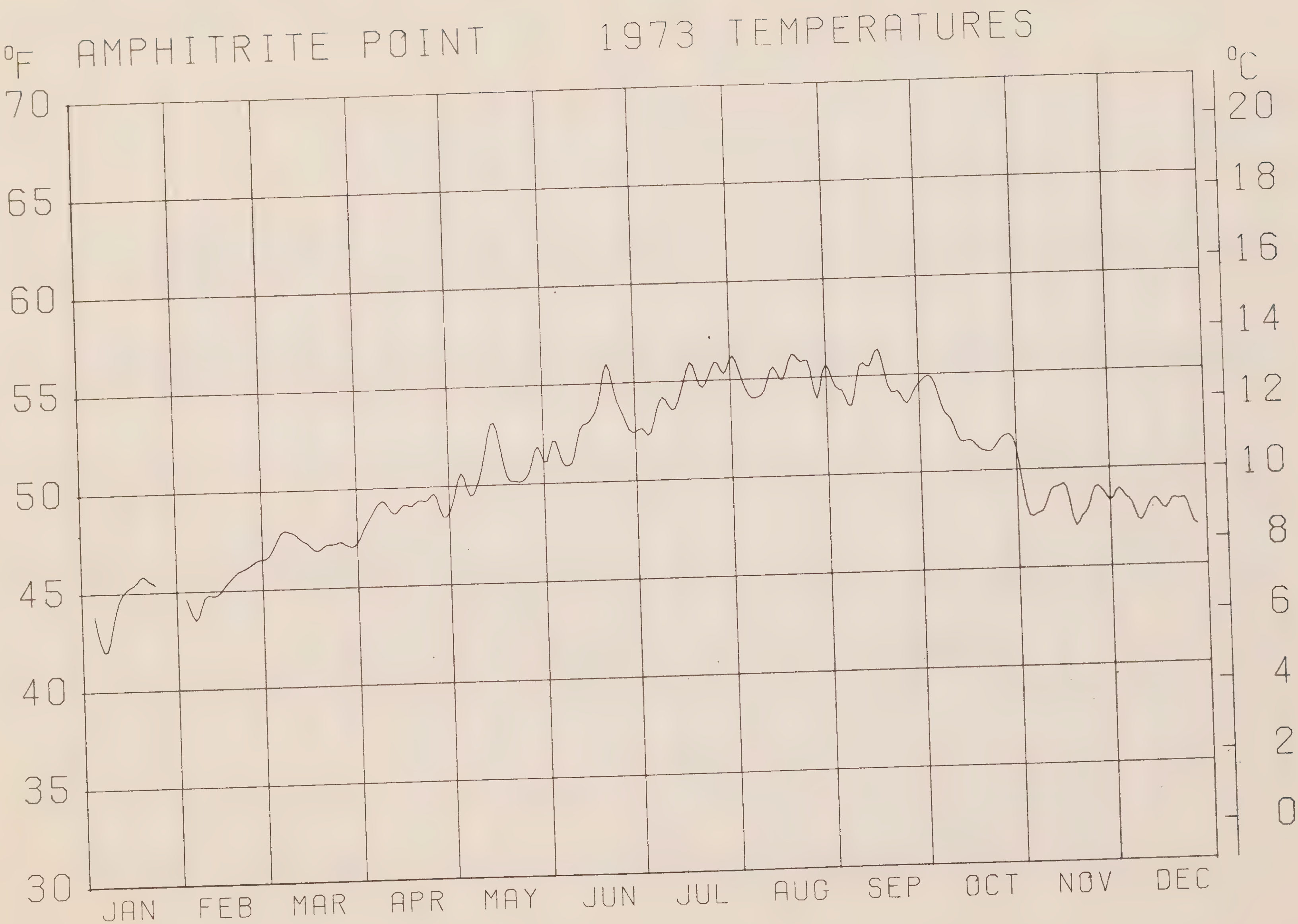
20
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC


AMPHITRITE POINT 1973 TEMPERATURES
°F
70
65
60
55
50
45
40
35
30
°C
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18
16
14
12
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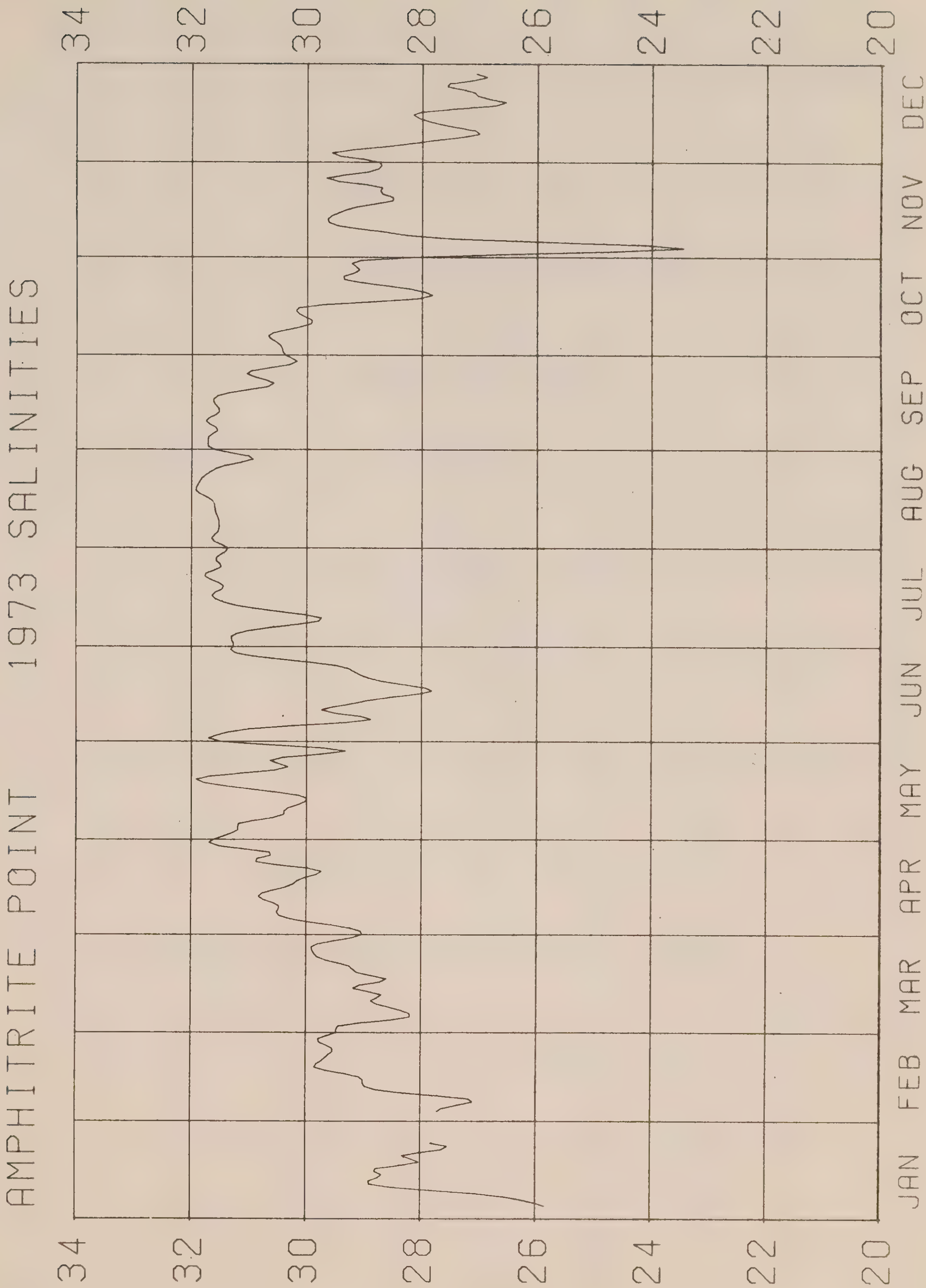
JAN
FEB
MAR
APR
MAY
JUN
JUL
AUG
SEP
OCT
NOV
DEC


AMPHITRITE POINT 1973 SALINITIES
34
32
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JAN
FEB
MAR
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JUL
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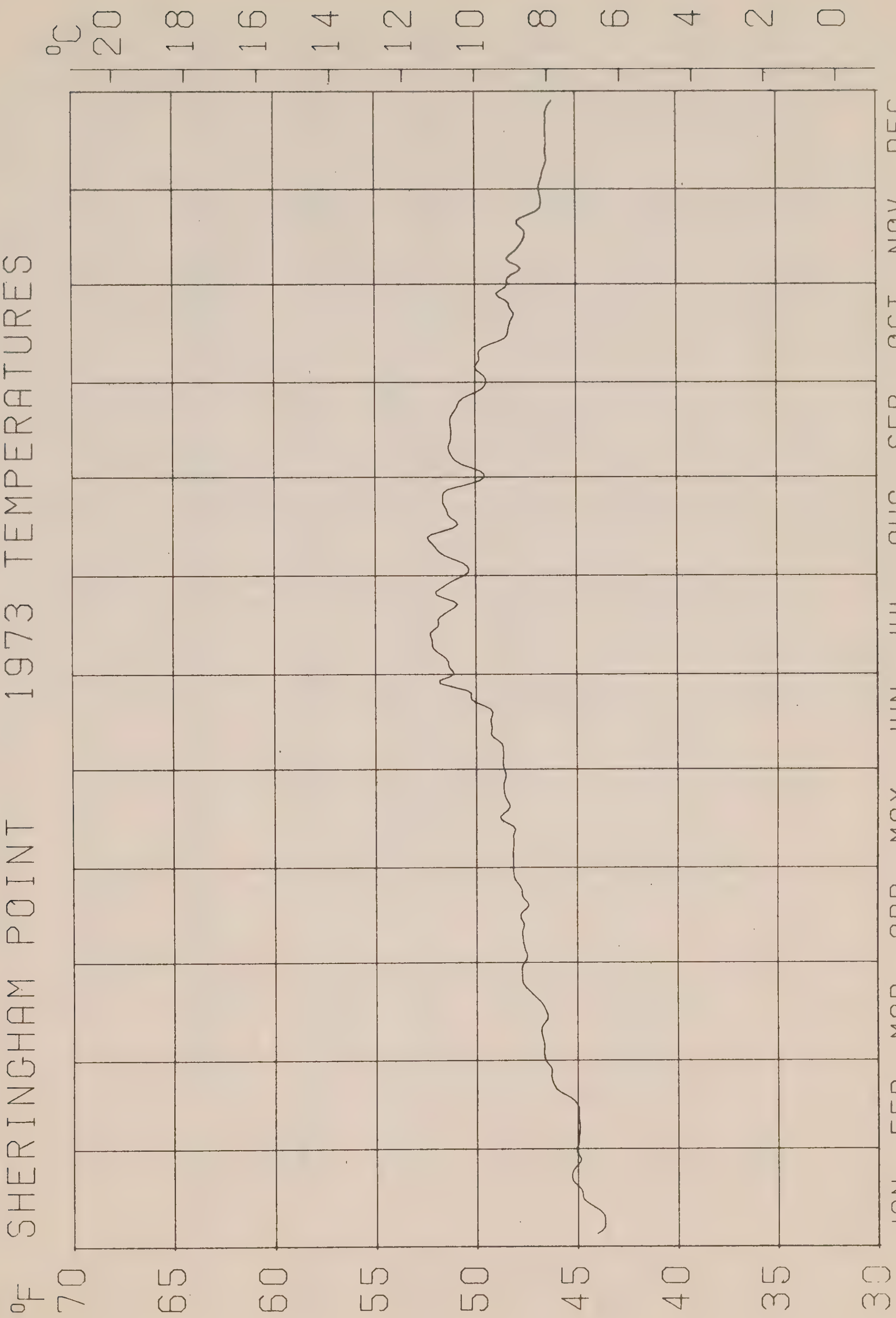
SEP
OCT
NOV
DEC


SHERINGHAM POINT 1973 TEMPERATURES
°C
20
18
16
14
12
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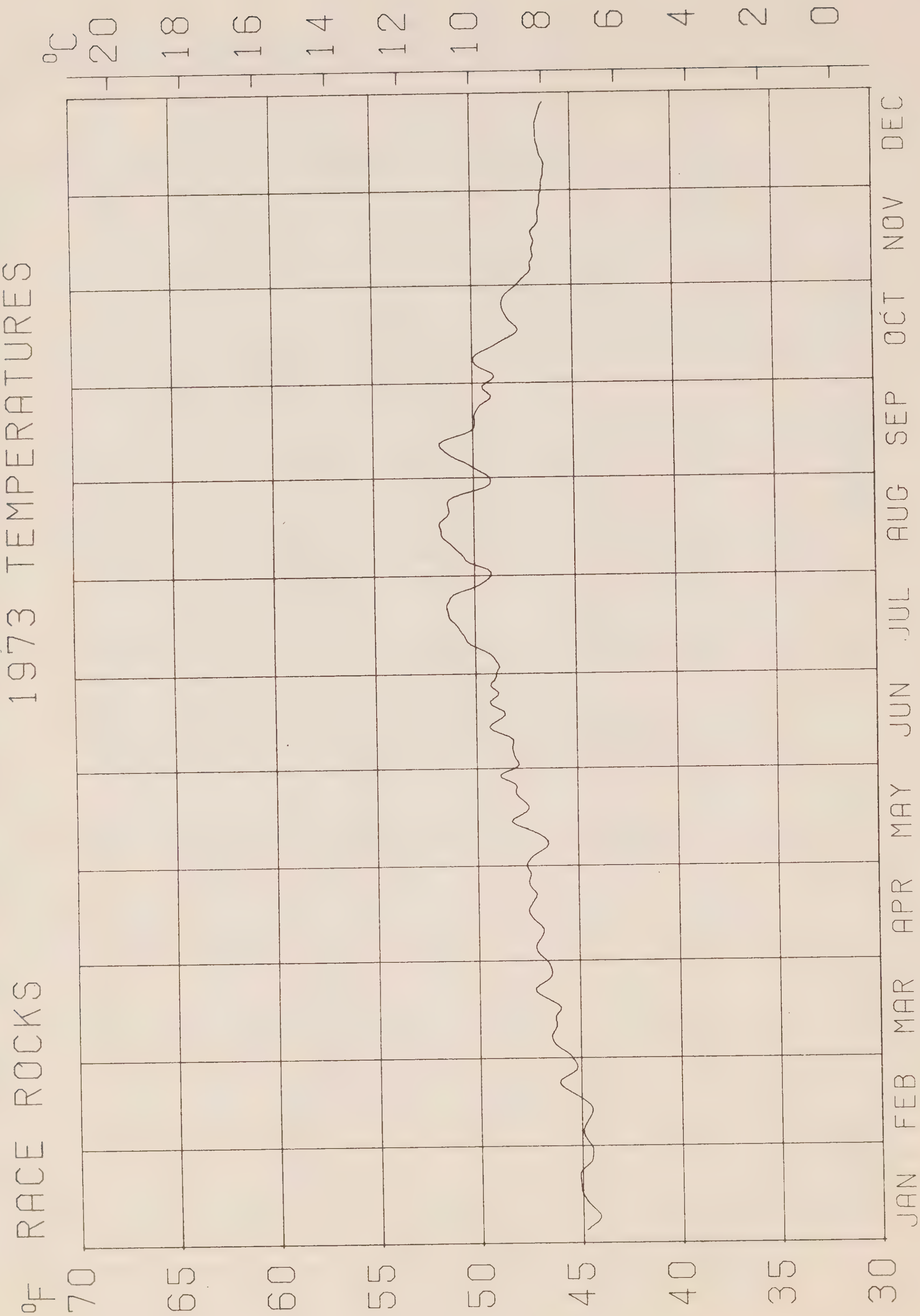
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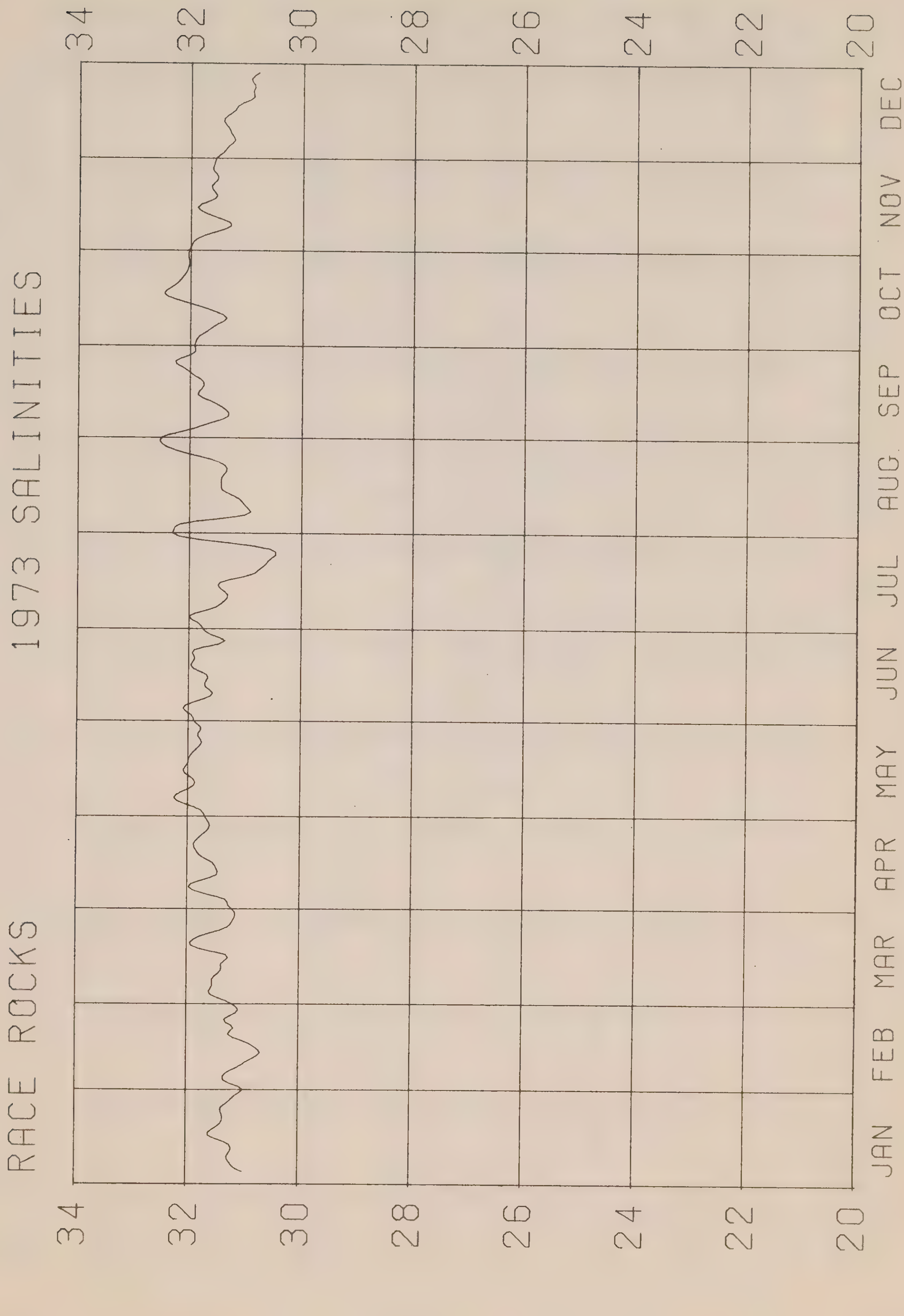
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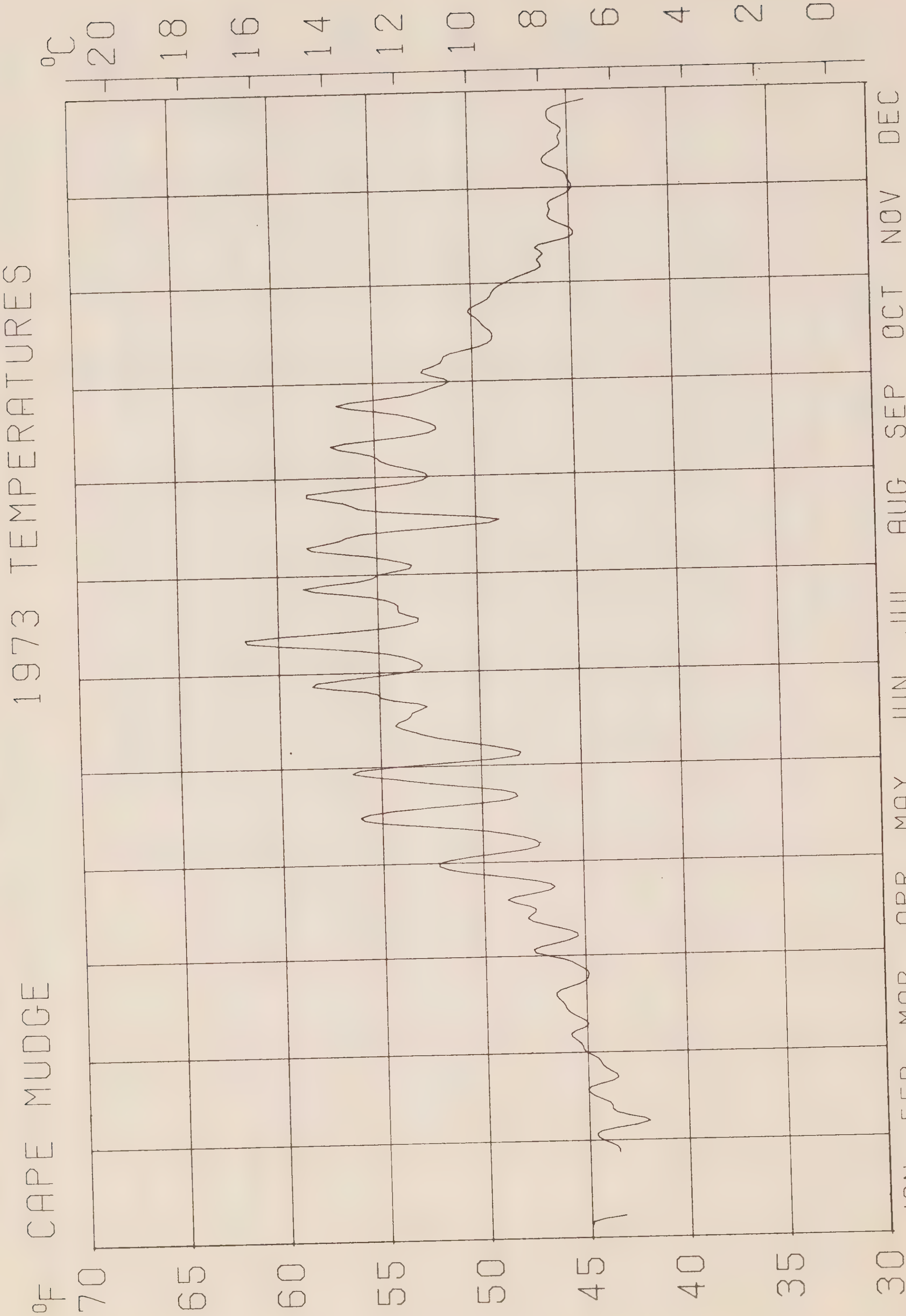
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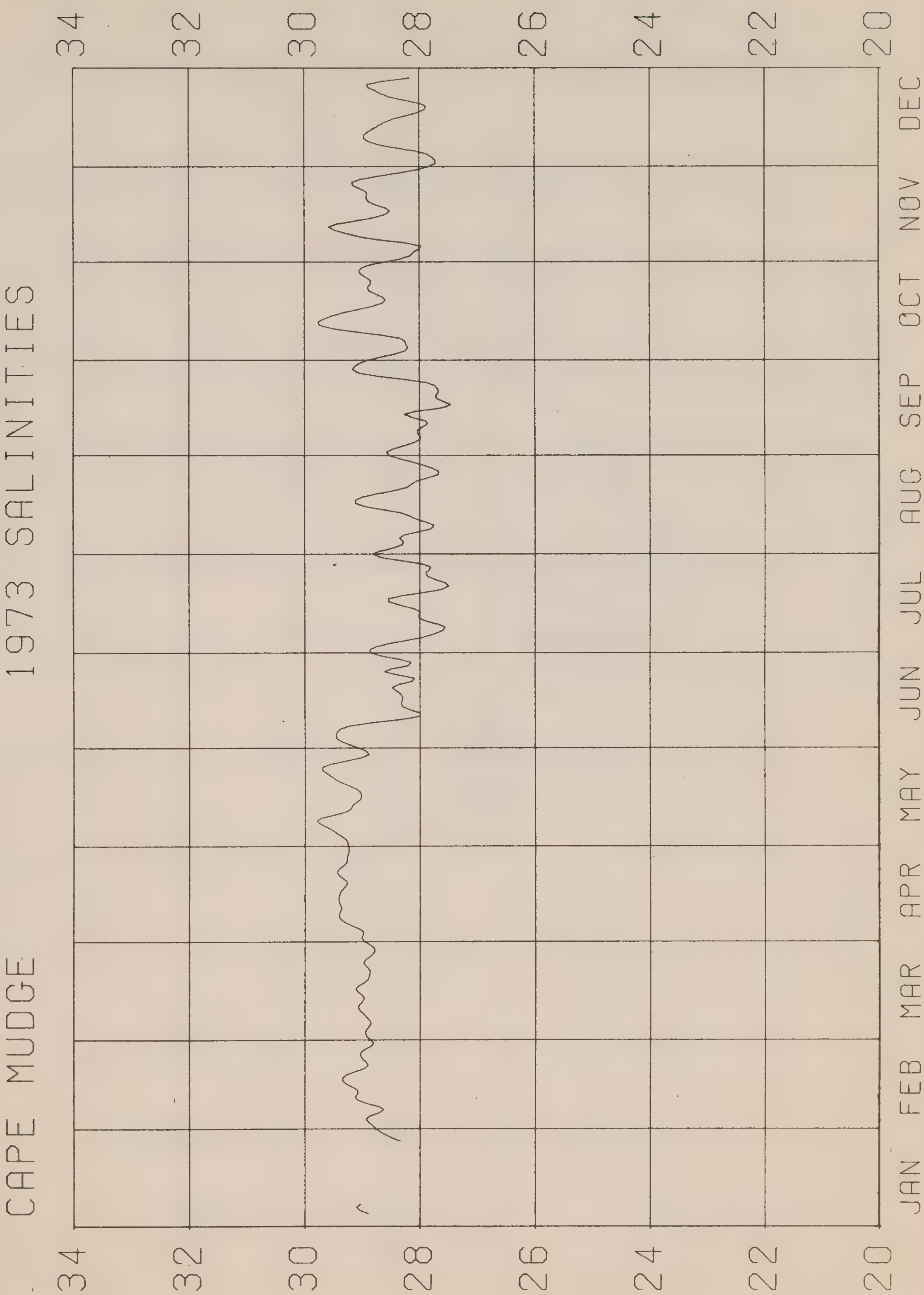
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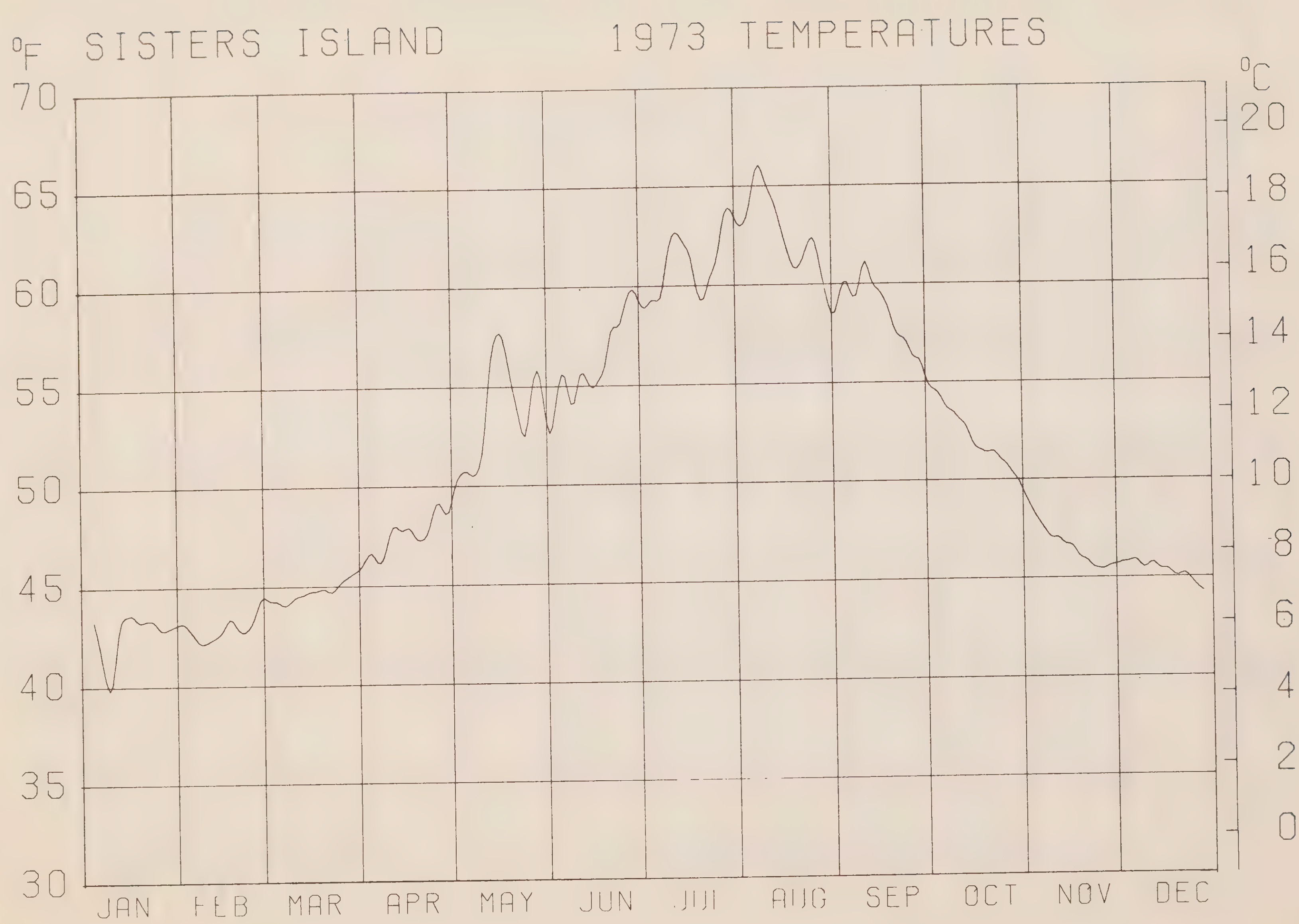
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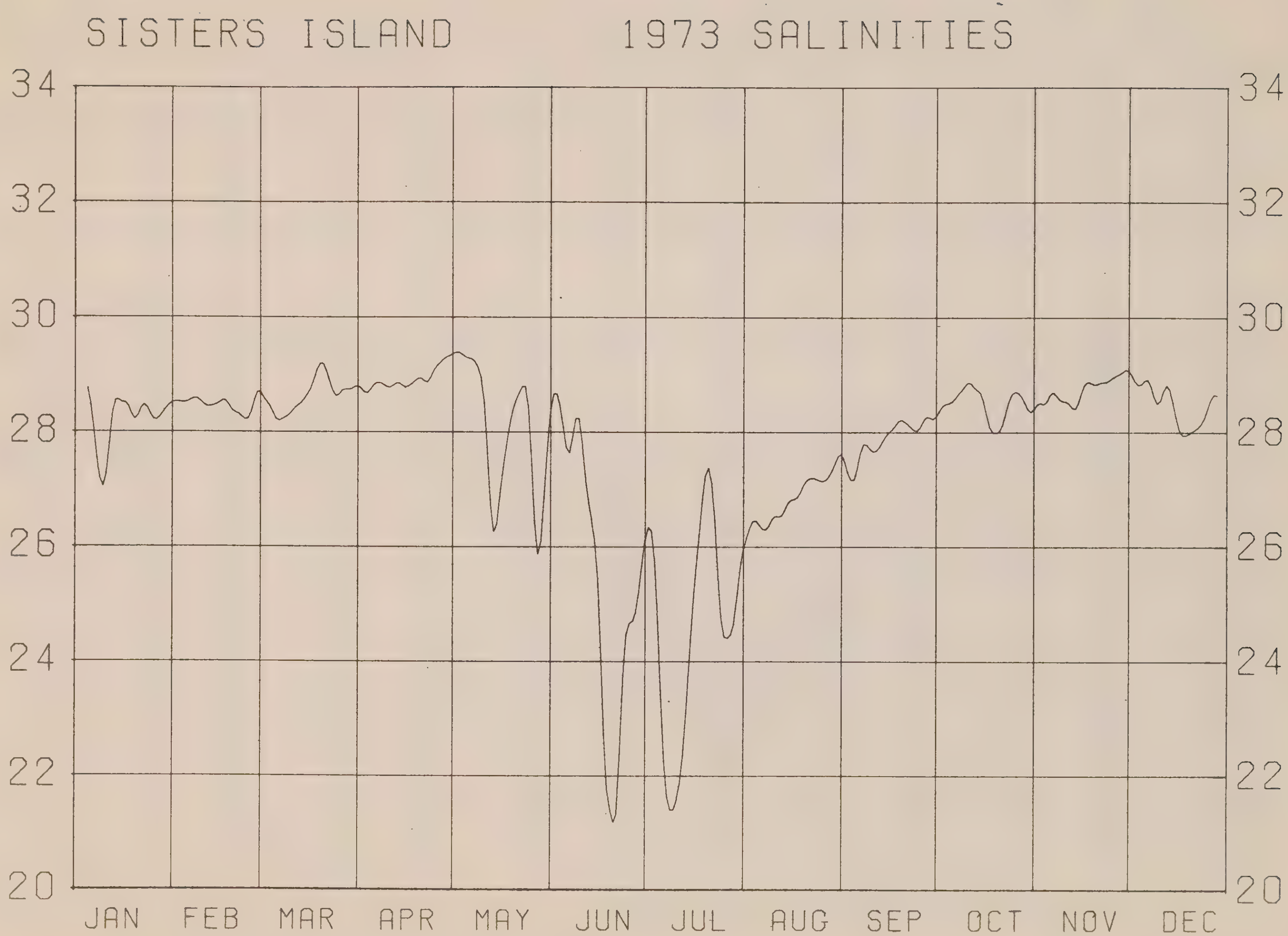
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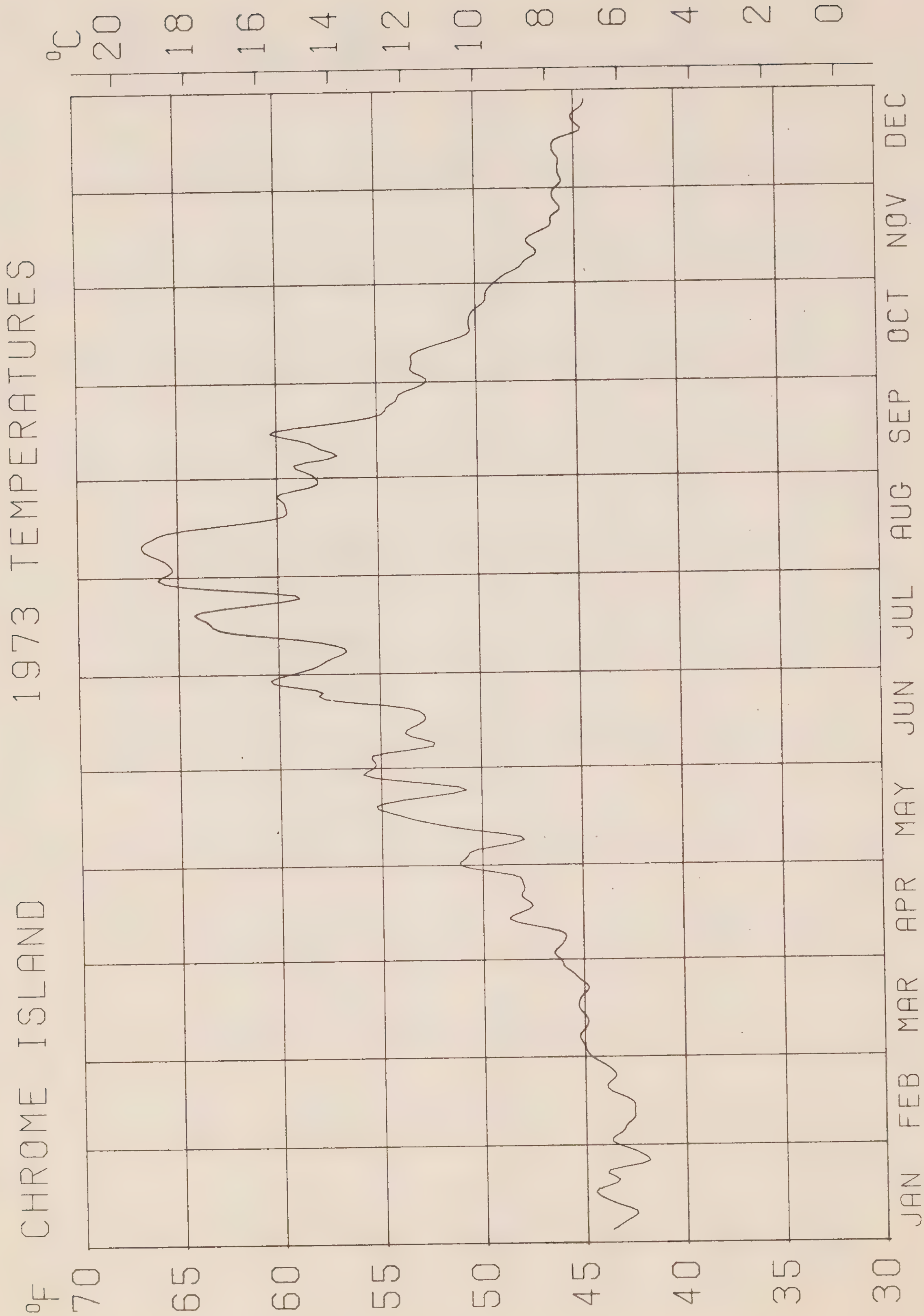
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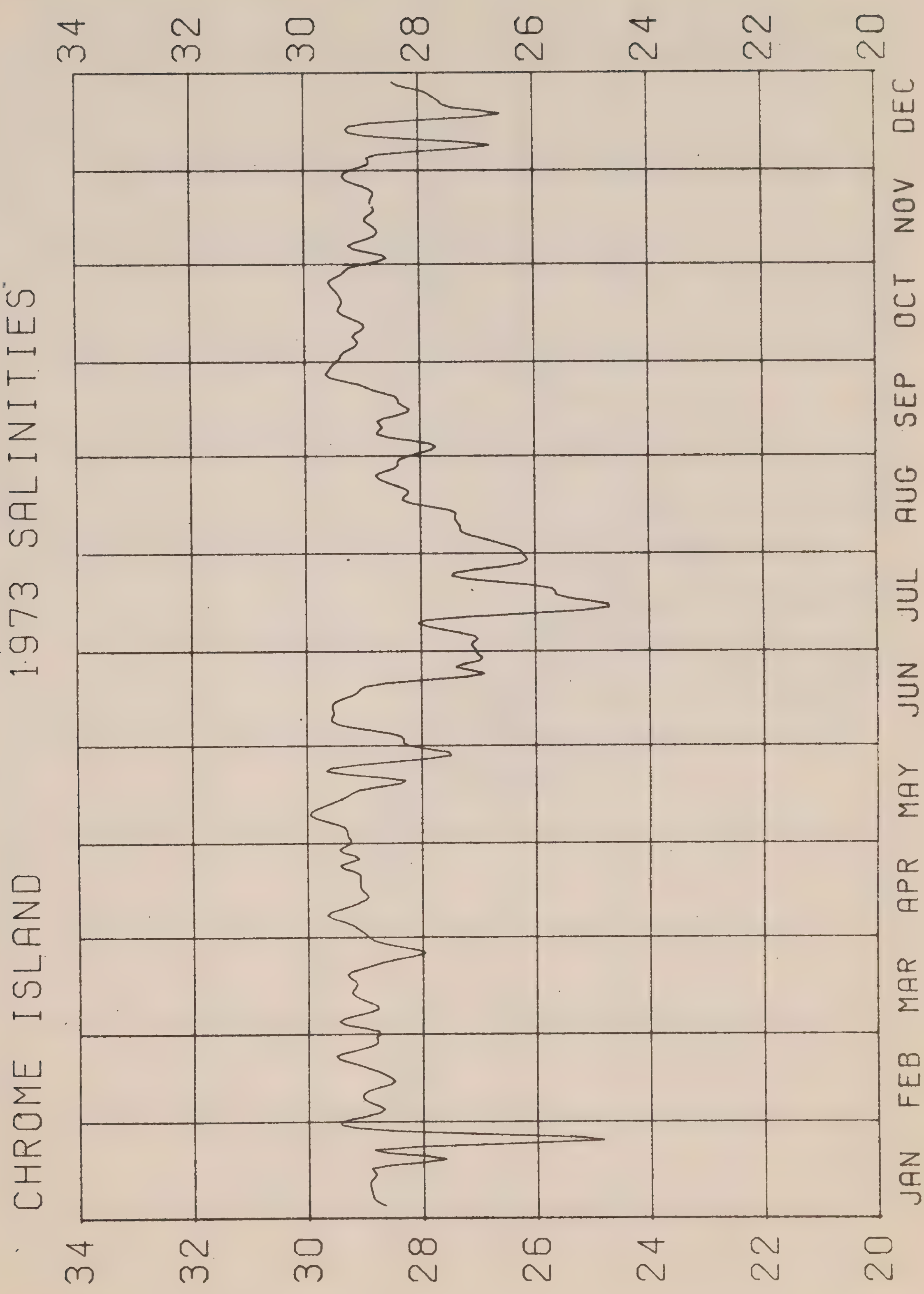
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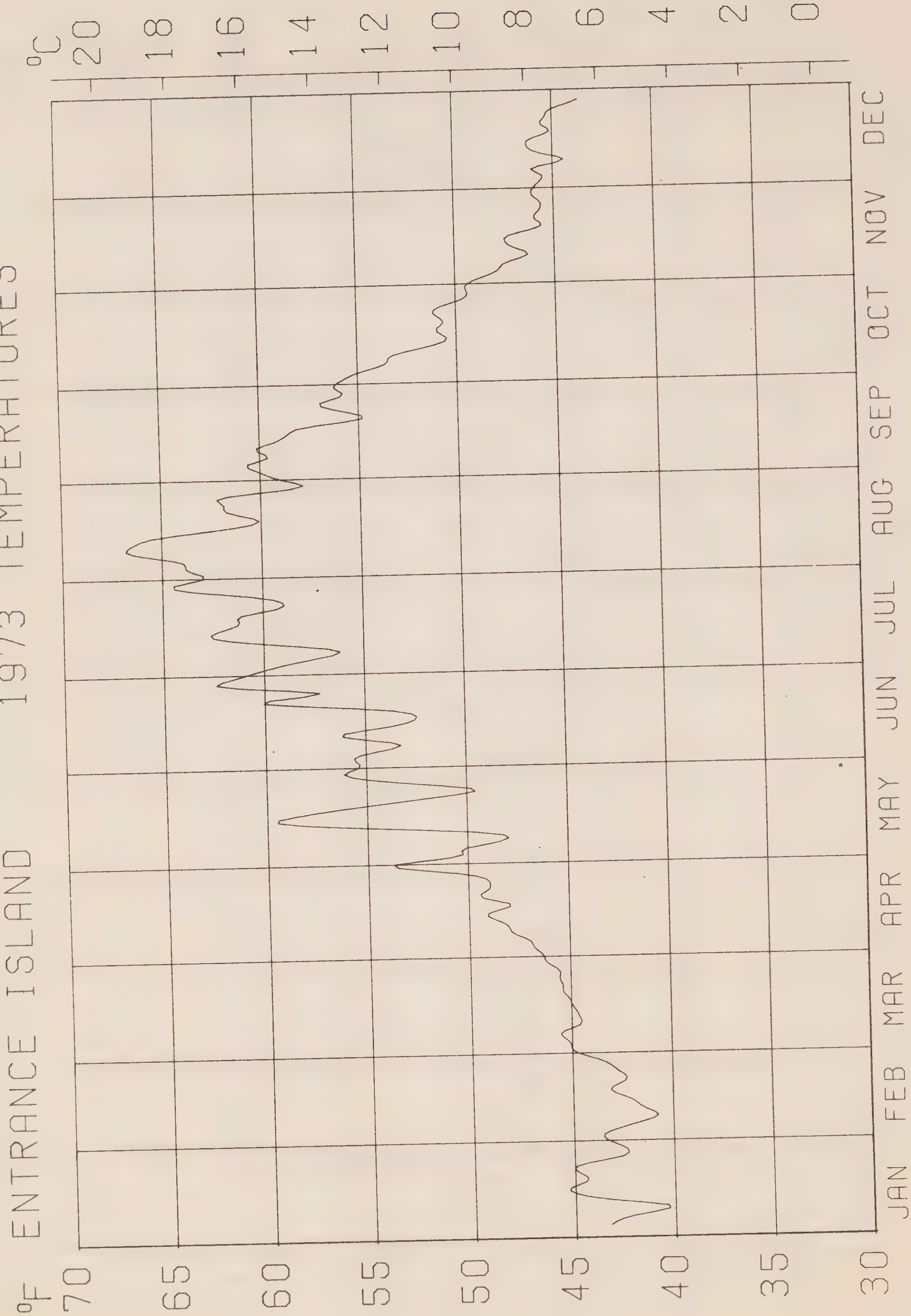
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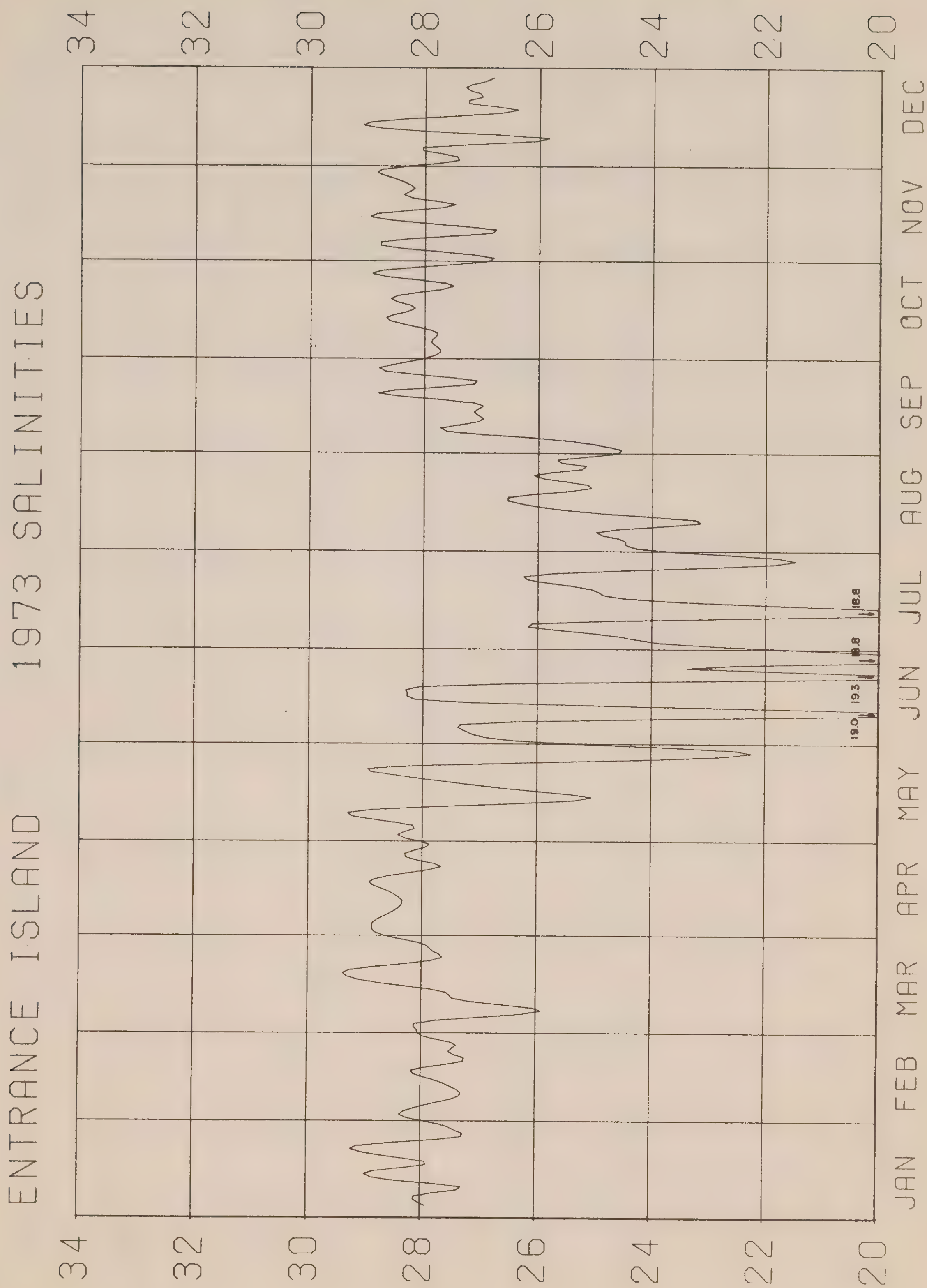
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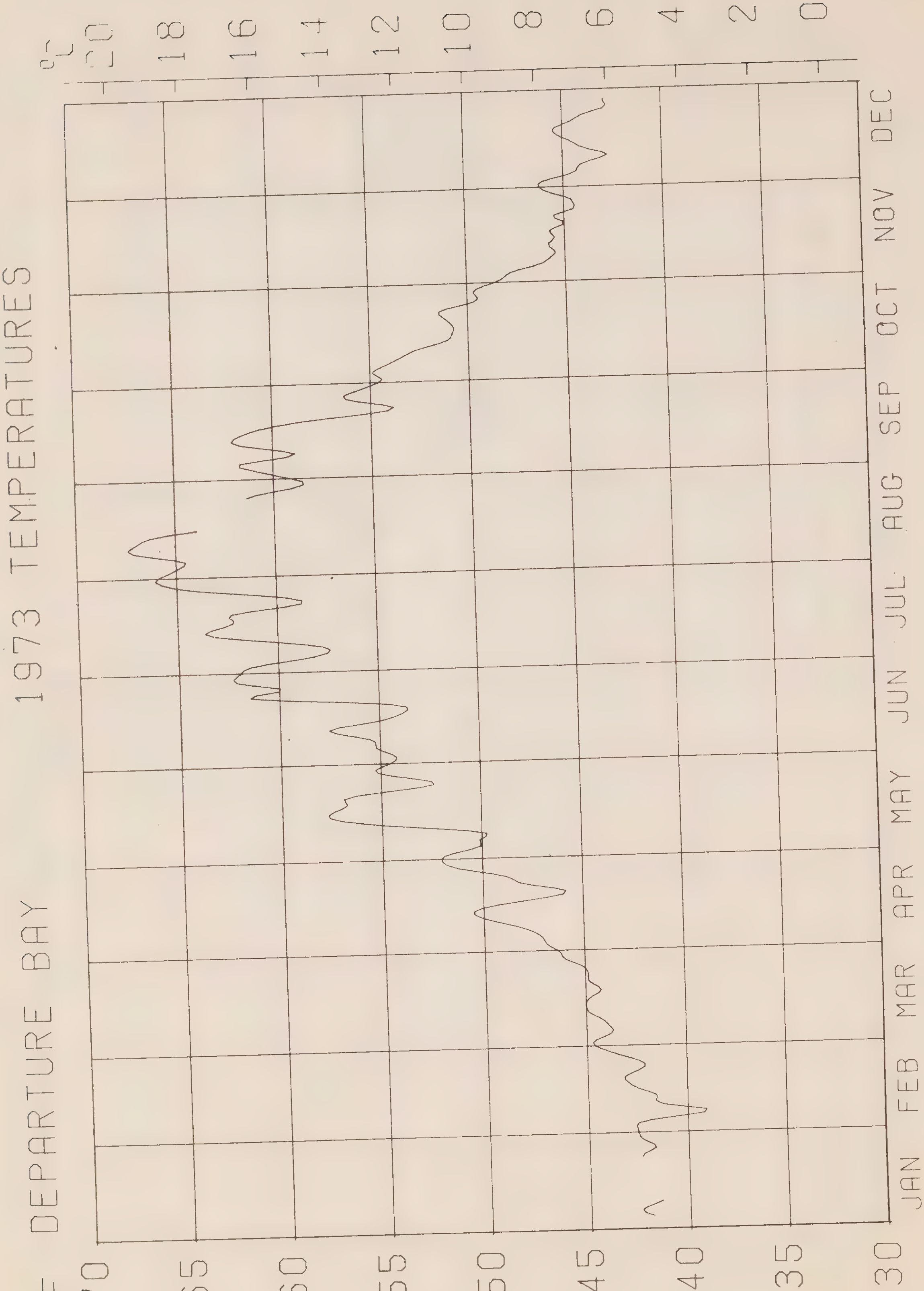
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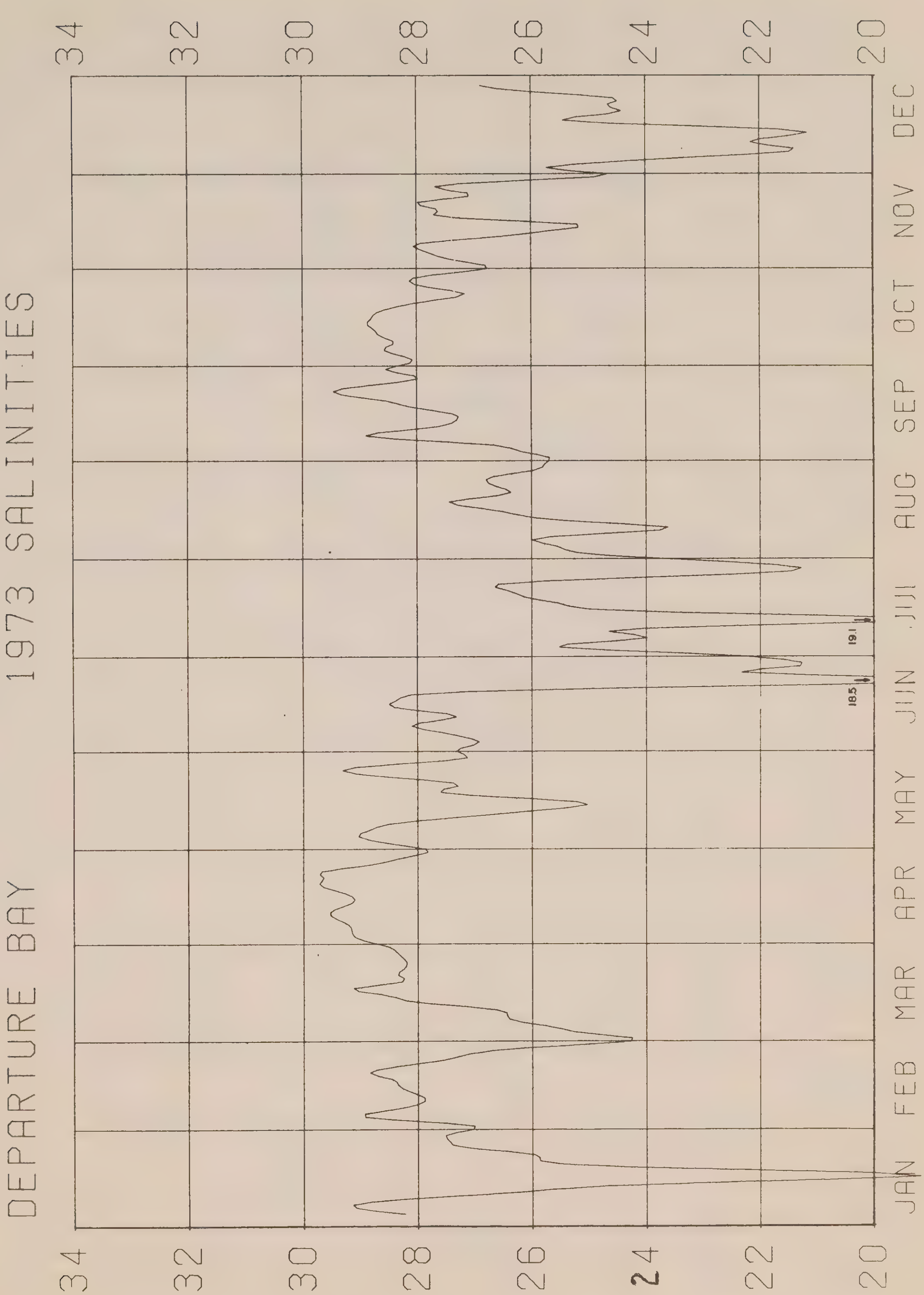
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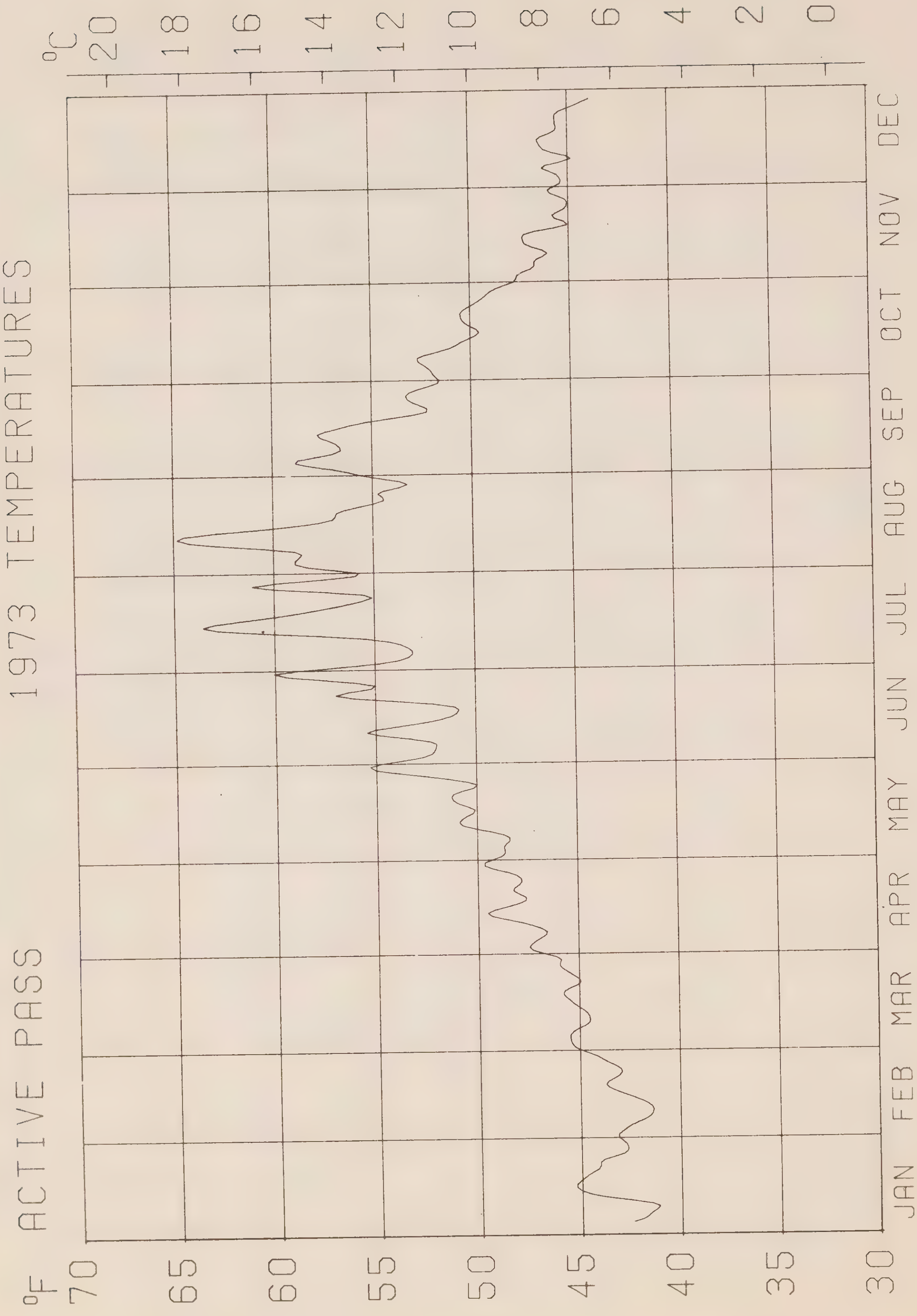
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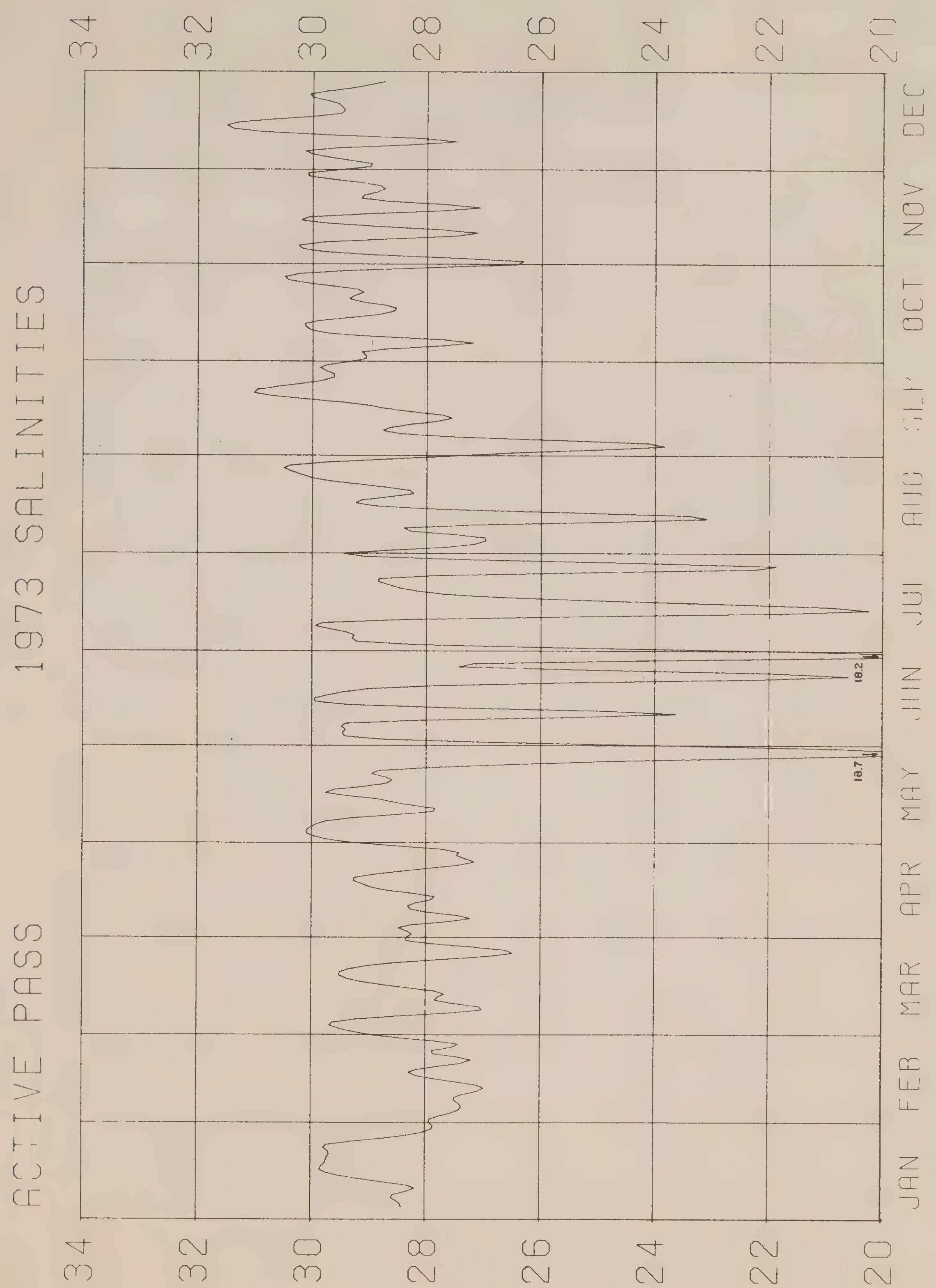
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Pacific Marine Science Report 74 - 12

OCEAN CHEMISTRY RADIOCARBON LABORATORY at B.C. Research, Vancouver, B.C.

ENVIRONMENT CANADA
Fisheries and Marine Service
Marine Sciences Directorate
Pacific Region
1230 Government St.
Victoria, B.C.

MARINE SCIENCES DIRECTORATE, PACIFIC REGION

PACIFIC MARINE SCIENCE REPORT 74-12

A SUMMARY OF RADIOCARBON MEASUREMENT PROCEDURE AND ELECTRONIC OPERATION OF THE OCEAN CHEMISTRY RADIOCARBON DATING LABORATORY LOCATED AT B.C. RESEARCH

3650 Wesbrook Crescent

Vancouver, B.C.   V6S 2L2

CANADA

A.B. CORNFORD & C.S. WONG

Victoria, B.C.
Marine Sciences Directorate, Pacific Region
Environment Canada

October, 1974

This is a manuscript which has received limited circulation. On citing this report in a bibliography, the title should be followed by the words "UNPUBLISHED MANUSCRIPT" which is in accordance with accepted bibliographic custom.

Acknowledgments

This report is a simplified description of the details necessary for a working knowledge of the Ocean Chemistry Radiocarbon Laboratory at the B.C. Research, Vancouver, B.C.

The facility was installed and put into operation under the supervision of the authors and under an agreement between Environment Canada and B.C. Research, Division of Applied Chemistry. The agreement allows B.C. Research to sell radiocarbon counting services to other clients, once the needs of the Ocean Chemistry Division, Marine Sciences Directorate F and MS, DOE have been met. The equipment in the laboratory is the property of DOE.

Thanks are due to Drs. G.S. Bien (La Jolla Radiocarbon Laboratory), Minze Stuiver (University of Washington Quaternary Radiocarbon Laboratory), James A. Lowden (Geological Survey of Canada DEMR Radiocarbon Laboratory, Ottawa), H.G. Ostlund (Miami Radiocarbon Laboratory), without whose advice, assistance and encouragement the laboratory would not have functioned. Ron Bellegay, of the Ocean Chemistry Division, MSD, was instrumental in acquiring the majority of the laboratory materials and Don Sullivan of La Jolla designed and pretested several of the electronic component modules. Computing was performed by Cliff Morgan of the Ocean Chemistry Division. Thanks are also due to Dr. M.L. Parker (DOE Western Forest Products Laboratory, Vancouver), Mr. E. Packee (Macmillan Bloedel Ltd., Nanaimo), Dr. W.S. Reeburgh (University of Alaska Radiocarbon Laboratory, Fairbanks), Dr. J.A. Lowdon and Dr. Minze Stuiver for supply of radiocarbon samples and standards. The assistance of the B.C. Research Shops Staff, Applied Chemistry Staff, and the technical help of Mr. R.D. Clyne

were appreciated.

We are especially appreciative of the willingness of Dr. Minze Stuiver to permit use of his unpublished design and for truly unselfish donation of his time and expertise. Without his assistance the laboratory would definitely lack its present quality.

Alan B. Cornford,
C.S. Wong,
December 1973.

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1. THE COUNTING FACILITY

1.1 LOCATION AND DIMENSIONS OF THE C-14 LABORATORY

The C-14 facility is located on ground level at B.C. Research on the University of British Columbia south campus, 3650 Wesbrook Crescent, Vancouver 167, B.C. The counting and preparation sections of the facility are to be air conditioned in order to remove furnace heat, to maintain the counters at constant temperature facilitating reproducible sample filling conditions, and to ensure consistent and stable operation of the transisterized electronics.

A floor plan schematic is given in Figure 1.

1.2 SHIELDING MATERIALS

Figure 2 illustrates a cross-sectional isometric of the front of the shield arrangement indicating the present dimensions. The minimum thickness of shielding materials is summarized below:

MATERIAL	MINIMUM THICKNESS	WALL
Lead brick	8"	Floor and end walls
	10"	Side walls
	12"	Roof
Pre-war steel sheet	3/8"	Roof
Paraffin	1-1/2"	All walls except front
30% borated polyethylene	1"	All walls

A list of the materials, including specifications, approximate quantities involved, and suppliers appears in Table 1.

The shielding produced by the 4" concrete building roof is minimal; however, 8" (minimum) of lead (approximately 3.5 dpm/100 cm^2) reduces the detectable radiation from the concrete walls and floor, and attenuates the cosmic ray flux by approximately 1/3; i.e.,the resulting meson count rate registered by the 13" long guard ring is reduced from 1000 cpm to approximately 350 cpm. These values are proportionately greater for both segments of the larger 34" guard ring, (Figure 29). A paraffin liner thermalizes the nucleonic cosmic component from the atmosphere, building, and lead shielding and the adjacent 30% borated polyethylene inner layer effectively captures the majority of these slow neutrons.

This incorporation of neutron moderator and high-capture cross-section material reduces the residual background of the 0.4 liter counter by approximately 0.43 cpm (from 1.80 cpm average to 1.365 cpm) and simultaneously reduces its barometrically dependant component.

The inner shield dimensions (approximately 40" long x 10" high x 14" wide) are sufficient to house both a 0.4 liter and 1-1/4 liter counter with respective guard ring counters. The larger counter has additional shielding from a 1 cm thick x 36" long cylinder of extremely radioactive-free lead (approximately 0.07 dpm/100 cm^2) in an OFHC copper container. This is incorporated between the counter and the newly designed double anticoincidence guard unit. (OFHC = Oxygen free high conductivity.)

Provision has been made for five preamplifiers in the front of the shield. Entry for viewing or repair is possible at present only by manually removing the lead blocks from the front wall after first lifting a polyethylene dust cover.

1.3 THE GUARD COUNTERS

The cosmic ray guard rings are concentric-wall multiple-anode cylindrical condensers utilized in the proportional counting mode, and operated in a continuous flow atmosphere of quench (Q-) gas consisting of 98.7% helium and 1.3% butane. The dimensions and construction materials for each are listed in Tables 2 and 3, and a schematic of the unit that shields the larger 1-1/4 liter counter is given in Figure 3. Care has been taken to use only those materials having very low radioactive contamination in all phases of the construction. In all cases materials of the same or inferior quality employed in existing radiocarbon facilities have contributed only a very small part to a total background count rate of the order of 0.5 cpm/liter-atmosphere.

The anticoincidence guard ring assembly housing the 0.4 liter copper counter registers a count rate of approximately 350 cpm while situated horizontally in the middle of the shielding arrangement. This unit (Figure 7) was constructed by the Department of National Defence Dockyard Machine Shop in Victoria in 1972. The only additional modifications necessary included machining a surface layer from the exposed inner cylindrical surfaces, cleansing with solvent and distilled water, and stringing the 0.002" diameter anode wire before assembly.

The larger 34" long double anticoincidence unit associated with the 1-1/4 liter counter has a design slightly modified by the author from that of the smaller guard. It was machined by H. Klassen in the B.C. Research Shops. The unshielded operating count rate is in the order of 3000 cpm for both segments which are individually vacuum sealed from each other and function independently, (Figure 29). This unit lies horizontally

beside the small counting assembly (Figure 2) and exhibits a shielded detection of approximately 1200 cpm in each segment. There is provision for a 36" cylindrical OFHC copper container filled with lead inside the inner guard into which is placed a polyethylene insulating liner and the Stuiver-type quartz-lined OFHC copper counter. The design and construction details are presented in Figures 3 and 4. The capabilities of this larger unit have not been fully determined and will be reported at a later date.

This arrangement may prove satisfactory for double-anticoincidence guard ring reduction of background and also provide a quantitative measure of the gamma contribution in the background passing undetected through a single-stage guard ring. Potential exists for utilization of the inner chamber as a large volume counter with shielding provided by the outer segment operating as a guard ring, if suitable precautions are taken to limit outgassing of the assembly components. Great advantage may also be possible if one of the segments is operated in the usual proportional counting mode capable of detecting alpha and beta radiations while the other segment is optimized to be especially sensitive to gamma radiation.

1.4 THE SAMPLE COUNTERS

Preliminary system testing was performed using a 1 liter (approximate effective volume) stainless steel counter from the La Jolla Radiocarbon Laboratory of Dr. H.E. Suess and Dr. G.S. Bien. The counter design and construction have the same essential features as that used at the GSC Radiocarbon Laboratory in Ottawa as illustrated in Figure 5. The residual contribution to the background from radioactivity in the counter materials was reported by La Jolla to be 4-5 cpm, however, due to improper shrouding

of this counter by the smaller anticoincidence guard ring, a total background of approximately 9 cpm was obtained (see Table 6).

During the test time-interval a smaller 0.4 liter OFHC copper counter was machined by both the author and H. Klassen using a design and materials list kindly supplied by Dr. M. Stuiver (unpublished communication). The dimensions of the existing guard ring and the available counter materials did not permit insertion of an intermediate cylindrical lead shield between the two. An illustration of the design is presented in Figure 6 (with permission). It should be noted that care has been taken to avoid materials that outgas volatile substances previously shown to contaminate and reduce efficiency with CO_2 gas counting.

A second larger OFHC copper Stuiver-type quartz-lined proportional counter has been constructed (1-1/4 liter effective volume) and is presently being brought into service. The characteristics and shielding for both copper counters have been optimized to the best knowledge of the author, subject only to material availability and limitations. The major shortcomings of the smaller 0.4 liter (corrected for the 1-1/4 liter counter) unit are: i) lack of a quartz liner (inner surface tin oxide coated for electrical conduction) to minimize production and detection of Compton and/or photoelectrons at the inner counter surface, ii) a non-optimal counter length-to-radius ratio, iii) absence of a cylindrical lead shield between counter and guard, and iv) use of brass alignment screws. All-metal Nupro bellows high vacuum valves seal the counter from the filling system.

In keeping with earlier electronic design limitations and high voltage stability requirements, the potential difference is established

between the anode collector wire (0.001" diameter hard drawn stainless steel) and tin oxide coated quartz tube inner surface (inner copper wall for the 0.4 liter counter) by application of the high voltage directly to the outer casing. For electrical insulation, the counter cylinder is placed within a 0.030" thick double layer Teflon sheathing and a Kovar-to-glass seal installed in the gas filling line. It has been noted that care must be taken to ensure the cleanliness of the Teflon and the signal output BNC electrical connector to avoid leakage and detection of resulting potential difference pulses.

The more significant performance characteristics of the 0.4 liter counter are summarized in Sections 4.2 and 4.4.

1.5 ELECTRICAL COMPONENTS AND CHARACTERISTICS

1.5.1 GENERAL

A summary of the electronic equipment for the C-14 counting system is listed in Table 4. The basic units and their specifications are shown in the flow diagram in Figure 14.

The counter high voltage (HV) supply has an operating maximum of six kilovolts (general operation is 5600 volts), and the guard ring HV supply has a maximum of 2-1/2 kilovolts (generally at 1100 volts). The Sorenson voltage regulator (line conditioner) has previously presented several internal stability problems, however, recently no detectable line transients or voltage fluctuations have been detected. Some high voltage supply instability was experienced after power supply overload on July 9, 1973, before its detection and repair.

At a voltage setting of 4000 volts for a pure filling of CO_2 gas to 2-1/2 atmospheres, no spurious counts should be registered over a period

of several hours in either counter. Initial instability problems (resulting in spurious counts) were solved by proper grounding of the various individual electronic components without introducing a series of ground loops with feedback or antenna characteristics.

The Keithley Model 111 preamplifiers were modified at La Jolla and housed in OFHC copper. The preamplifier/amplifier/discriminator unit for the counter contains a Canberra linear-delay Model 859 and is modified by Mr. Don Sullivan according to the WSPS-2 post amplifier and pulse-shaping unit circuitry employed at the La Jolla Radiocarbon Laboratory. The remainder of the electronic components are fully transistorized and have been incorporated into the system as received.

An interface is presently being designed to utilize signals from selected scalar decatron outputs in order to activate the servo-magnetic driver-relay pen mechanisms of a 10-pen Esterline Angus event recorder. This will monitor the reliability of long count periods and eliminate the necessity for a second long count, a procedure similar to that employed by the GSC C-14 laboratory in Ottawa and the University of Miami C-14 Laboratory, Miami.

1.5.2 COUNTER ELECTRONICS

The counter discriminator is adjusted to a signal threshold acceptance limit of approximately 2.6 mv (potentiometer setting of 7.50 turns). The optimal lower noise gate is generally established for a signal to noise ratio of 5 to 1. The counter output pulse height vs. discriminator threshold (potentiometer setting) relationship in this region has a linear characteristic (see Figure 8); but above 3.5 mv the discriminator has no limiting effect and accepts all signals independent of size (voltage).

Since the C-14 beta spectrum has an approximate energy distribution in the region from 0 mv to 300 mv (energy-width=42 KeV, energy maximum = 155 KeV) essentially all C-14 beta pulses are treated with equal amplification and detection probability. The lower portion of the spectrum, however, is lost in optimizing discrimination against very low energy noise pulses generated both in the counter and electronic equipment. This amounts to elimination of only a few percent of the total beta counts. A non-statistical characteristic of the effect of variation in the discriminator threshold on observed count rate is given for the 0.4 liter counter in Figure 9.

The counter preamplifier has an approximately linear attenuation gain-factor of 10 (see Figure 10) when in-line with a 50 ohm-2 watt resistor.

The counter amplifier (Canberra Model 813 - preamp/amp/disc) has a rated linear amplification with maximum gain of 600 and saturation level of 10 volts. Measured values, with both coarse and fine gain settings at their minimum values, are recorded in Figure 11, and show a gain of 1000 with maximum output of 20-1/2 volts. The amplifier displays a doubling (possible improper rectification) for inputs greater than approximately 12-1/2 mv from the preamplifier (amplifier outputs greater than approximately 13-1/2 volts) and clipping or saturation at 20-1/2 volts. Both the signal clipping and the doubling do not adversely affect the counting due to their involvement only at signal inputs significantly in excess of the threshold acceptance value. There is a suggestion that the amplifier is current-limited rather than voltage-limited.

The flow diagram in Figure 14 illustrates the sequence of amplification, discrimination, square wave pulse-shaping, delay (by a constant preset 3 microseconds), and coincidence testing against the guard ring signal before registering on one of two scalars. One scalar registers all counter signals above threshold while the other records only those events occuring within the counter but at a time different by more than 280 microseconds from a guard ring event.

1.5.3 GUARD RING ELECTRONICS

The guard ring electronic signal detection system also illustrated in Figure 14 includes similar features to those discussed for the counter. However, the preamplifier is modified to supply the high voltage directly to the anode wire array and retransmit the signal along the same electrical lead in order to maintain the outer casing at ground potential. A 50 ohm - 2 watt resistor is inserted in-line before the amplifier and pulse-shaping unit. The amplifier gain (potentiometer setting: 0.74 turns) is adjusted to minimize saturation. The discriminator potentiometer setting remains at 0.00 turns, the most sensitive position, in order to detect events from all possible sources that might also register in the counter or associated electronics. There is also an advantage to enhancing the sensitivity of the anticoincidence network by making the guard ring circuit an antenna to pick up transient signals and thereby reject them from the residual counter background. The delay potentiometer is set to 0.00 turns to ensure full utilization of anticoincidence. This is elaborated below in conjunction with the signal width potentiometer (setting of 0.46 turns for ring signal width of 280 microseconds) establishing the anticoincidence deadtime. The signal pulse duration from the counter is also accounted

for in terms of a 'coincidence loss' during which time the counter is unable to register a second pulse.

1.5.4 ANTICOINCIDENCE SYSTEM

This system is designed to reject electronic events occuring within both the guard and sample counters initiated by the same particle, ray, or electrical transient. An 'event' in this context is the production of an ion-pair by ionization of a gas molecule within the confines of the electrostatic field maintained between the anode wire and cylindrical detector wall. Both components of the ion-pair traverse the gas by means of the electrostatic force although the transit time to the appropriate collector depends upon several factors: i) the magnitude of the force field (proportional to the high voltage), ii) the diameter of the collector electrodes, iii) the distance from the point of pair production to the collector, iv) the mobility of the species produced. (In general the traversal time for the ion is slow compared with that for the electron and is differentiated out from the fast part of the signal.) The probability for pair production is also dependent upon the following: i) the ionization potential of the gas and its capture cross-section for the impinging species, ii) the pressure of the gas within the counter. It is apparent that an event produced within both a guard counter and a properly shrouded sample counter from the same particle or ray at identical times (for all practical purposes) may not be detected by the two sets of electronics at the same time. However, the characteristics of the electronic modification units are adjusted to compensate for this possibility. The average signal pulse width is approximately 3-5 microseconds (determined mainly by the decay time). After amplification and square wave

pulse-shaping the guard ring pulses are expanded to 280 microseconds (width potentiometer setting of 0.46) with zero delay. A 'coincident' counter-produced pulse is electronically modified and the resultant square wave is discriminated to be registered only if originally in excess of 2.6 mv. This counter pulse is delayed by 3 microseconds to ensure coincidence detection at a measurable time later than, but encompassed within, the same guard ring pulse-time. The 280 microsecond width ensures that the possible traversal delays of the ion-pair are accounted for; and, in fact, greater than 95% of all counter pulses are within 50 microseconds of the guard pulse. This arrangement assumes that the detection time for an event in the guard ring, also produced in the counter, is shorter in all cases or at least within 3 microseconds of that produced in the counter.

1.5.5 OPTIMUM OPERATING PARAMETERS (See Table 11)

2. OPERATING CHARACTERISTICS

2.1 ESTABLISHING AN OPTIMUM OPERATING-POINT AND SAMPLE PURITY CHECK

The determination of the operating point on the proportional plateau is dependent upon the electronic circuit design. Best optimization is achieved for a unit incorporating both a low and high-energy discriminator enabling the isolation of an energy window of variable width within the limits of the beta spectrum. The window is generally established in a range approximately 2 mv to 35-40 mv for C-14. An appropriate procedure using α and β discrimination is given by H.G. Dorsey, Precise Measurement of Oceanic Radiocarbon, MSc Thesis, University of Miami, November 1973. In the absence of an upper window gate in the present system we obtain only the composite characteristic in Figure 12.

At present the adopted procedure includes determination of the slope of the counter cosmic plateau and the applied voltage value at the 1/2 plateau height. An arbitrary operating point has been chosen near the middle of the plateau well within the linear portion (5600 volts for both the 0.4 and 1-1/4 liter counters at 2-1/2 atmospheres pressure CO_2). The voltage difference between the operating point (5600 volts) and the half-plateau cosmic count rate value at 4900 volts (i.e., a 700 volt interval) found for pure samples is maintained for all subsequent samples measured under identical conditions. Within the levels of small amounts of impurity (i.e., approximately 2 cpm or less variation below the acceptable cosmic value from the graph in Figure 13) the voltage increase required (δV) to attain an acceptable 1/2 plateau value is added to the operating point voltage (i.e., $5600 + \delta V$, where δV is the voltage increment in $4900 + \delta V$) before overnight sample counting. Inherent in this procedure are the assumptions of negligible variation in the plateau slope for small levels of impurity, and a plateau shift to higher voltage by an amount approximately proportional to the concentration of the impurity. This, in effect, assumes that the magnitude of the shift in the C-14 β spectrum is proportional to the amount of impurity and that for small levels of impurity there is negligible reduction in total β detection efficiency (see H.G. Dorsey, cited above). The observed flat beta plateau suggests that the counter is almost 100% efficient for ionization occurring in the sensitive volume. The foregoing procedure is reasonably assured for this system since all samples with half-plateau values varying by more than $\pm$ 15 volts from the 4900 value were originally repurified and samples within these limits gave reproducible count rates within statistical limits for no

change in the 5600 operating voltage. Preliminary testing has confirmed (Figures 13 and 21) that no adjustment of the operating point voltage is required if half-plateau count rates greater than 31 cpm at 4900 volts are obtained for dead (no C-14) samples, approximately 36 cpm for 6000 years old, and 38 or greater for modern C-14 samples. All of these criteria apply for both copper counters filled to 2-1/2 atmospheres CO_2. In keeping with the sensitive nature of proportional counting with CO_2, no tests have been conducted to establish lower purity correction factors but rather repurification has been preferred.

A third purity correction technique is employed by several laboratories. An external source of standard radioactivity having higher energy and disintegration rate greater than cosmic radiation is used to determine the variation in the 1/2 plateau voltage (or similar fraction of this value) from sample to sample or the reproducibility at a given plateau position for lower amplifier gain. A subsequent operating voltage change is made to compensate for deviations from the normal or established purity criteria. A shortcoming in the reliability of this technique for the 0.4 liter counter occurred due to an inability to relocate accurately the radioactive source near the counter. Examples of the results from this type of procedure are reproduced in Figure 15.

The following general effects on the characteristic counter profile (total cosmics, background, and C-14) resulting from impurities in the CO_2 sample (in particular, electronegative impurities such as oxygen and halogens) are illustrated in Figure 16. For increasing amount of impurity: i) the threshold voltage and the entire profile both shift to higher voltage, ii) the 1/2 cosmic plateau height decreases (i.e.,also moves to

higher voltage), iii) the mid-plateau cosmic and C-14 values decrease slightly, iv) for substantial impurity there is evidence that the plateau slope increases (Figure 17 shows build-up of impurity within the counter over a time period; Figure 18 also shows a steep plateau as a consequence of large impurity and counter geometry), v) the length of the plateau decreases.

During a 16-day residence time of a single sample within the stainless steel 1 liter counter, an outgassing (and/or partial leak) was monitored via C-14 count rate and half-plateau value. The results are graphically illustrated in Figures 19 and 20. This procedure was repeated on a shorter time scale for the 0.4 liter counter and results of 1/2 plateau values are shown in Figure 21.

2.2 BAROMETRIC EFFECT

On May 22, 1973 the lead shielding was removed and the paraffin and a borated polyethylene inner lining inserted. All previous results were subject to the unshielded nucleonic component of the cosmic ray flux and neutrons originating from the lead. De Vries (Nucl. Phys. 3,65 (1957), and Fergusson and McCallum (N.Z.J. Sci. Tech., B38, 577 (1957)) reported this cosmic component of the background to shift significantly as a result of variation in the thickness of the atmospheric absorber, (Broecker et.al, Int. J. Appl. Rad. and Isotopes, 7, 1 (1959)). Similar observations were recorded with the present unit; a plot of total and background cosmic count rate along with barometric pressure vs. time is shown for February 1973 (Figures 22 and 23), and for February and March 1973 in Figure 24. The inverse relationship between the cosmic ray flux monitored by the guard ring as well as the cosmic component to both the

counter cosmics and the anticoincidence background with observed daily barometric pressure fluctuations is quite evident. A straight line computer least-squares fit of data from these plots (Figure 25) produced slope values used to correct the count rates to an arbitrary value of 760 mm Hg (1 atmosphere). A comparison of uncorrected and corrected count rates vs. applied voltage is shown in the profile in Figure 27. This figure indicates that the magnitude of the correction factor is significant for statistical count rate time periods. All of these latter profiles illustrate the low slope of the plateau; a set of corrected plateau values is given in Table 5 corresponding to Figure 27. No relationship between sample pressure and the barometrically dependent component of background was established although a brief study of profile shift with applied voltage as a result of variation in sample pressure was noted, (see Figure 26). An increase in sample pressure may be correlated to a rise in background count rate presumably due to a higher stopping cross-section for cosmic gamma radiation with increased molecular density in the counter.

Introduction of paraffin to thermalize (moderate) fast neutrons and 1" thickness of 30% borated polyethylene to capture these thermal neutrons (subsequent emission of the two low energy gamma rays) effectively reduced the background of the 0.4 liter counter from approximately 1.7-1.8 cpm (barometrically dependent) to approximately 1.365 cpm, only slightly dependent on barometric fluctuations. A more complete study of the barometric dependence on background count rate is given in the results section.

2.3 PULSE HEIGHT ANALYSIS OF THE C-14 BETA SPECTRUM

Initial determination of the optimum threshold cut-off voltage is essential in order to maximize discrimination against low energy cosmic muons and amplifier noise while simultaneously minimizing cut-off of the lower end of the C-14 beta spectrum. This may be achieved by pulse height analysis of the counter output signal. Figure 28 illustrates an approximate plot of number of pulses vs. preamplifier output pulse-height monitored 'by eye' and individually recorded in histogram fashion (integral widths of 5 mv) from the persistent trace of a memory storage oscilloscope. Despite the extremely tedious procedure this proved to be more effective than a pulse height analyzer with pulse-to-time converter which lacked sensitivity below 200 mv. Even amplification of the output signal from the counter did not produce meaningful spectral analysis.

A monitor of count rate (cosmics and C-14) vs. discriminator setting in Figure 9 indicates that the chosen settings are appropriate. A more complete review of the use of pulse-height analysis of β spectra is summarized in the author's review of Miami Tritium Laboratory operations.

3. CHEMICAL PROCESSING AND OPERATING PROCEDURES

The CO_2 preparation and purification system is shown in the schematic flow diagram in Figures 30 and 31. A complete step-by-step description of operation procedures for the unit as initially installed (not fully revised for some of the most recent modifications), was compiled by R.D. Clyne in May, 1973. The essential features of the system are presented here. Documentation of the Miami Radiocarbon Processing System similar to that described is reported by H.G. Dorsey, Precise Measurement of Oceanic Radiocarbon.

3.1 CARBON DIOXIDE PREPARATION AND PURIFICATION

3.1.1 CO_2 PREPARATION LINES

The vacuum system as illustrated in Figure 30 is designed to provide for liberation of CO_2 from all sample types, using a wet process for oxalic acid or (bi)carbonate and combustion flow tube or Parr bomb for organics. Reservoir 1 may be used to introduce acidified $KMnO_4$ or H_3PO_4 to sample reaction flask 2, (Appendix: Preparation of CO_2 by Oxidation of Oxalic Acid with Acidified $KMnO_4$). The line is initially evacuated, purged with nitrogen and re-evacuated; the CO_2 evolved is dried and frozen in liquid nitrogen trap 6 before chemical purification. Alternate methods of transforming the carbon in samples to CO_2 are incorporated into the line in the form of an oxygen-pressurized Parr combustion bomb 11, and a Vycor combustion tube 13, 14, 15, preceded by oxygen purification and flow regulation 17. It was necessary to introduce ballast volumes 5 into the line to retain wet chemicals and minimize clean-up. The majority of the individual Pyrex units are either fused together or connected with greased ball-and-socket joints for ease of removal, causing only occasional minor vacuum difficulties at operation to 10^{-3} mm Hg or better. A secondary low-vacuum line is used for system evacuation and continuous removal of oxygen of combustion. The sample storage, radon removal, and final purification section includes a mercury diffusion pump 24, capable of vacuum to approximately 10^{-6} mm Hg in the Pyrex glass system. The flow rate of CO_2 within the system is regulated with manometers and bubblers and ultimate vacuum measured with Pirani guages.

3.1.2 WET LINE PURIFICATION

Trap 5-6 is used for ballast or final low volume containment of

combustion samples. Trap 18 absorbs SO_3 and collects water of combustion. Traps 18 and 19 are fitted with glass-frit dispersion tubes for efficient absorption of halides and sulphur oxides respectively. The CO_2 is passed over dry-ice, frozen and pumped in a liquid nitrogen trap and stored.

3.1.3 FINAL FURNACE PURIFICATION AND RADON REMOVAL

The sample is passed over hot platinum-asbestos and silver ribbon at 420°C (to reduce nitrous oxides to N_2) and subsequently over hot copper turnings at 420°C to remove residual traces of oxygen and halides. An air-jacketed copper radon removal trap 23, (which also removes nitrogen oxides), establishes and maintains the proper temperature gradient to be approximately 95% efficient or better (W. Dyck and J.A. Lowdon GSC C-14 Laboratory Ottawa). Provision will be made for unaided and continuous multipass thermal recycling over the copper furnace 13, 25, which is periodically regenerated by flushing with hydrogen gas. Samples are stored at pressures less than one atmosphere in transportable 5 liter Pyrex flasks and a small percentage retained separately for C-13/C-12 isotopic fractionation analysis.

3.1.4 COUNTER FILLING SYSTEM (Figure 31)

Storage flasks containing purified CO_2 are transferred to the counter filling line directly or to the storage line for radon removal by decay. All samples are passed over dry-ice to remove any residual water vapour from the copper furnace although this has generally been found unnecessary. The sample to be introduced for counting is pumped under liquid nitrogen temperatures and slowly distilled into the appropriate freeze-out stem which is partially insulated with an air gap between the stem and a Pyrex

glass sleeve immersed in liquid nitrogen. The temperature gradient so produced prohibits any oxygen from condensing and this is pumped away before introducing the sample slowly into the counter by evaporation and monitor with a 12" Heise Bourbon gauge, 28. When the CO_2 counter pressure approximates that desired (in general 1900 $\pm$ 0.5 mm Hg), valve 31 is sealed and the residual CO_2 bled back to the flask while maintaining a similar 1900 mm line pressure until all frozen CO_2 is gaseous. The valve to the counter is then reopened and the line pressure equalized to exactly 1900 mm with the variable volume valve 27 before 31 is reclosed and counting begun. After counting, the sample may be recovered and stored in the storage section of the line for replicate counting at a two week interval. A summary of routine procedures for daily, weekly, and monthly operation are provided below.

3.2 DAILY, WEEKLY, AND MONTHLY COUNTING PROCEDURES AND DATA COLLECTION

3.2.1 DAILY C-14 MEASUREMENT ROUTINE (To be modified as required)

1. The following general information format should be completed (Table 12).

2. All other information required for reporting sample data to Radiocarbon Supplement of American Journal of Science should also be noted.

3. After each overnight count period reduce the high voltage to the half-plateau voltage monitored before the run and recount for approximately 30 minutes. Consistency within 1-2 cpm should be obtained or the cause for deviation investigated. If there is cause for suspicion that the overnight count is somehow erroneous, the event recorder should be consulted (when implemented) and a second count performed at 4000 volts for 30 to 60 minutes to detect stray or spurious counts from radon or electronic instability.

4. TURN THE COUNTER HIGH VOLTAGE DOWN AND PUT THE POWER SUPPLY TO RESET!!! (With the high voltage OFF, but scalars on while removing the sample, spurious counts are frequently detected from gas flow along the counter walls.) While pumping the counter no counts

should be recorded within 60 minutes.

5. Remove the overnight sample from the counter and store in the original sample flask or pump away if it is to be discarded. To retain samples for a long period reprecipitate as $SrCO_3$ or similar solid, then seal and store in glass.

6. Vacuum pump the sample counter to be refilled for a minimum of one hour or more until a residual pressure of less than 0.5×10^{-2} torr is maintained while sealed for approximately 15 minutes.

7. Readjust the Heise Bourbon gauge to zero immediately before refilling the counter.

8. Introduce the sample and adjust the pressure to exactly 1900 mm Hg. Record the counter temperature and room barometric pressure.

9. Increase the high voltage slowly to 4900 volts while watching the scalars to detect continuous discharge or similar mishap.

10. Monitor the 1/2 plateau value for approximately 20 to 30 minutes and adjust the voltage to the acceptable value according to Figure 13. Record the final value of 1/2 plateau and count rate along with the new working voltage. Within the levels of small amounts of impurity (approximately 50 volts or less adjustment), the voltage increase (δV) required to attain the acceptable 1/2 plateau value should be added to the operating voltage (i.e.,5600 + δV), where δV is the voltage increment in 4900 + δV, beginning the overnight count. The 1/2 plateau counting period has been found essential for establishing the stability of the electronics before a long count may be begun.

11. If the purity of the sample is below the acceptable level, it is recommended procedure to replace it with another. It is, therefore, wise to begin the filling procedure early to permit this replacement should it be necessary.

12. Count all samples for approximately 1000 minutes or more if possible.

3.2.2 WEEKLY AND MONTHLY C-14 MEASUREMENT ROUTINE

	Mon.	Tues.	Wed.	Thurs.	Fri.	Weekend
Week #1	S-1	S-2	Std	S-3	S-4	Bkgd (2 counts)
Week #2	S-5	S-6	Std	S-7	S-8	Bkgd "
Week #3	S-1	S-2	Std	S-3	S-4	Bkgd "
Week #4	S-5	S-6	Std	S-7	S-8	Bkgd "

S-No.---Sample Number

Std ---Standard Preparation

Bkgd ---Background Preparation

1. The pattern may be altered from time to time and a very old sample substituted for one of the weekend background counts to eliminate the necessity of short run-time and hence poor statistics. In this case, however, it is advisable to monitor the counting period with the event recorder to ensure consistency in count rate.

2. The procedure is adopted to give replicate counts of samples and to ensure the statistical reproducibility and absence of radon contamination.

3. If inconsistencies are encountered the procedure will have to be altered.

4. Both standard and background samples may be used repeatedly if no signs of deterioration are detected. However, several preparations of both should be available for intercomparison.

5. The calculations of absolute ages should be done on a monthly basis using the monthly average of background and standard preparations. No count should be deleted from this average unless there is good evidence for its invalidity.

6. Monthly plots of variables, including temperature, barometric pressure, background, C-13/C-12 ratios, etc. may be of benefit.

3.3 LIST OF PRECAUTIONS FOR RADIOCARBON LABORATORY OPERATIONS

1. The HIGH-VOLTAGE must be turned down before evacuating the counter. DOUBLE CHECK!!!

2. The Kovar-to-glass-to-Kovar electrical insulator must be

maintained under a minimum of one atmosphere pressure when operating at high voltage.

3. The valve #31 should be closed at all times when working with the counter filling line to avoid exposure of the counter to contamination by air should a mishap occur.

4. A sample should never be counted overnight without first determining the 1/2 plateau correction to be applied to the operating voltage.

5. A sample should not be counted immediately upon filling the counter in order to enable electronic stabilization.

6. The purification line furnaces should not be turned too high without close attendance.

7. The Parr combustion bomb should be treated with care and the operator should ignite the fuse from a safe distance with the bomb in its protective housing.

8. If there is suspected contamination, error in processing or counting, or similar information critical to the validity of any or all future data, it must be noted in the log book and brought to the immediate attention of the officer in charge. This includes results that are not consistent with expectation or general trends.

9. All new chemicals and cylinder gases should be checked for purity and in some way intercompared or intercalibrated with the previous materials.

10. All chemicals and instruments including vacuum pumps should be checked periodically for any alterations.

11. If wear or consistently faulty operation is apparent for any piece of equipment it should be replaced or upgraded. The system should also be expanded to meet the economic requirements and sample volume available once routine operation is feasible for all possible sample types.

4. RESULTS, CALCULATIONS AND INTERPRETATIONS

Test results for characterizing the counting system are briefly presented to indicate baseline parameters for future reference and to demonstrate the reliability of the system.

4.1 ONE-LITER BIEN-TYPE STAINLESS STEEL COUNTER

The one-liter counter obtained from the La Jolla radiocarbon laboratory, with known background of approximately 4.5 cpm, provided an interim measure for optimizing the electronics during construction of the two copper counters. The majority of these tests have been discussed and illustrated in Sections 1 and 2. A summary of numerical data appears in Table 6.

4.2 0.4-LITER STUIVER-TYPE OFHC COPPER COUNTER

4.2.1 BACKGROUND COUNT RATE

Upon completion and incorporation of the 0.4 liter copper counter into the system, initial counting consistency was demonstrated (see Table 6). Variation in barometric pressure was monitored daily and from monthly data, (Figure 25), the C-14 values were normalized to 29.921" Hg and recorded as "barometrically corrected". Counting reproducibility was further improved with installation of 1" of 30% borated polyethylene, however, statistical results were only achieved with the addition of an outer layer of 1-1/2" paraffin. The increased shielding produced a background reduction of 0.43 cpm, from approximately 1.8 cpm to 1.365 cpm, (Tables 6 and 7), a factor of approximately 24% mainly attributable to the nucleonic component of cosmic radiation. Table 7 gives a continuous two month monitor period of background magnitude and reproducibility. This includes successive multiple counting of the same sample preparation, multiple repurification and recounting of the same sample at well spaced time intervals, and consistency between different preparations of the same and different background reference samples. A

single sample could be used repeatedly over a period of a month (and presumably much longer) with only occasional need for repurification. No evidence for radon contamination was detected in excess of the consistent 0.020 cpm alpha contribution to the background. Barometric pressure dependence, temperature corrections and sample quantity reproducibility are not included in Table 7 averages. All three factors contribute to uncertainties in the present data and are assessed along with additional data in Section 4.4.2. Values demonstrably outside statistical limits (2 standard deviations , $\pm\sigma$ from the mean value) evidenced by unacceptable levels of impurity or shown to be erroneous through several counting periods have been omitted from the background average for the two month period. The background fluctuates seasonally and, therefore, a reasonable procedure involves monthly averaging and computation of all data for samples counted within that time interval.

4.2.2 NBS OXALIC ACID COUNT RATE

Several samples of the same batch NBS Oxalic acid were converted to CO_2 via the "wet process" (using acidified $KMnO_4$). Each was purified in identical fashion to general procedures for all samples, and a small percentage of each retained for C-13/C-12 mass spectrometric isotope determination. These ratios are not presently available and, therefore, the extent of isotopic fractionation is unknown but expected to be small since approximately 95% or better recovery of liberated CO_2 was maintained. Table 8 is comprised of data obtained both from multiple counts of a single preparation and from several different preparations of a single supply of the National Bureau of Standards Oxalic Acid Radiocarbon Standard.

The data displays general counting reproducibility; however, consistency between different samples is occasionally sporadic. The apparent variations in count rate may be attributable in part to inadvertant exposure of the counter anode to high voltage under vacuum conditions. This possibly is illustrated by the low average value of 6.726 cpm omitting the two apparent anomalous bracketed values in the table. Their inclusion in the average gives a value of 6.823 cpm which may be compared with data from the reconstructed counter (Section 44) having an average of 6.899 cpm. The lack of data reliability demonstrated by occasional count rates in excess of 2 standard deviations from the statistical mean in background, standard oxalic acid preparations and subsequently in the dendochronology calibration (Section 4.2.3) prompted counter reconstruction. The values are reported here as a documentation of this possible reduction consistency and beta counting efficiency arising from anode deterioration, both of which may not be readily apparent from limited data. The standard reporting value of 95% (NBS Oxalic Acid-background) of 5.092 $\pm$ 0.080 cpm for Table 8 (using the background value from Table 7 of 1.356 $\pm$ 0.037 cpm) may be compared with the new counter values of 5.263 $\pm$ 0.076 and 1.359 $\pm$ 0.017 cpm respectively.

4.2.3 C-14 DENDOCHRONOLOGY AND HISTORICAL TREE RING DATING COMPARISON

In order to ensure undisputed credibility of the radiocarbon dating results, a preliminary intercomparison with a second independent method of dating is essential. Equally important is demonstrated ability to reproduce values consistent with those determined by several other established laboratories. A program involving this intercalibration has been implemented and brought to a satisfactory degree of reliability,

consistency, and accuracy. This program is by no means complete, but is subject only to the availability of suitable intercalibration samples. No inconsistencies are anticipated, although slight modifications to the purification process dependent upon sample type and origin may be required.

Dr. M.L. Parker, Canadian Forestry Service, Western Forest Products Laboratory, Environment Canada, kindly provided a complete series of 27 tree ring samples from 678 to 1968 A.D. obtained from the stump of a Douglas-fir tree felled near Shawnigan Lake, Vancouver Island. The small size of the rings necessitated their grouping into 50 year segments for C-14 dating and weighting of the samples according to volume in order to establish the proper mean age for each block. From the samples provided, all of which were historically tree ring dated, 5 were chosen according to specifications of age and size providing for duplicates of each and an age distribution spanning the entire range of the growth period. A sixth tree ring intercalibration sample (GSC #22) was also kindly supplied by Dr. J.A. Lowdon from the Ottawa Geological Survey of Canada Radiocarbon Laboratory. The procedure of duplicate preparations and replicate counting at a one or two week interval was not strictly followed. The results from the abbreviated program are presented in Table 9. No correction has been applied to the values for possible isotopic fractionation, barometric effect, modern day C-14 fluctuations; the prime objective at this stage being to establish C-14 ages within a few percent for general comparative purposes. Results reported by W. Dyck, Ottawa GSC Report 66-45, 1967, on an 1100 year old Douglas-fir tree from Vancouver Island substantiates somewhat irregular short term deviations of $\pm$ 2.5% from the present day natural C-14 concentration of living organisms. The incompleteness of

the present study and uncertainty of the magnitudes of some of the correction factors prevents a similar assessment at this time and is beyond the scope and intent of this preliminary work. Difficulties in preparation, purification and reproducing counter fillings were initially encountered although both consistency and accuracy of date correlations increased with progressive technical efficiency. Table 9 reports difficulty in general with the more modern samples (processed first); the youngest requires further clarification and the second lacks replication of duplicates. Possible electronic instability generated by exposing the anode to high voltage while evacuating the counter may have accounted for the high degree of inconsistency with the GSC #22 sample. Consequently, the study was abbreviated and the anode wire replaced. Therefore, it is only fortuitous that the average of 4 separate counts of this sample outside 2σ statistical limits but within 4σ should give a reasonable average value correlation with the historical age. The remainder of the results, although not fully replicated, give an estimation of initial counting accuracy to within limits subject to the corrections outstanding. Redetermination of values applying subsequent barometric correction improves the comparison of C-14 dates with dendochronology. Further intercalibration is continuing and will be reported with associated studies. An estimate of these are summarized on the following page. The background and standard values from this early data are then more comparable to more accurate recent data in Section 4.4.2.

Sample Description	Value & Bkgd (cpm)	Age Before 1950 (yrs.) C-14 (T-1/2 = 5730yr)	Historical
Background (Tank CO_2)	1.344 ± 0.036		
NBS Oxalic Acid Std	6.840 ± 0.078		
Intercalibration Sample #12	6.590 ± 0.076		
WFPL #7 (See Table 9)	5.980	983	980
GSC #22 "	6.138	706	822
WFPL #24 "	6.480	135	125

In this respect, results of samples that also have been intercalibrated between two independent laboratories at the University of Washington, and the University of Miami, will be provided.

4.3 1-1/4 LITER QUARTZ-LINED STUIVER-TYPE OFHC COPPER COUNTER

Outgassing properties of the anode-array insulators in the double anticoincidence guard ring assembly have prevented a detailed assessment of the operating characteristics of the new larger counter. A schematic of the counter profile without anticoincidence is given in Figure 29, indicating very acceptable operation. Both segments of the guard ring operate with satisfactory characteristics after evacuation and subsequent purging with quench gas, however, their properties deteriorate with time and the system may have to be cured of outgassing before operation is feasible. The background count rate for this system has been shown to be approximately 3 cpm using either segment of the guard ring and approximately 1.7 cpm for periods of 1/2 hour using only the outer segment. The latter, however, is subject to instability yet to be totally corrected.

4.4 0.4 LITER COUNTER (AFTER REPLACEMENT OF ANODE WIRE)

4.4.1 RADON CONTAMINATION

The dendochronology calibrating was terminated before completion in order to replace the 0.4 liter counter anode wire. Subsequent to cleaning, restringing, and reassembling the counter, the residual background showed a time dependent increase and then decrease in magnitude approaching the former background value after approximately 20 days, (Figure 32). This behaviour most likely resulted from contamination of the counter with radon (half-life: 3.824 days) during either acid washing or exposure of the copper surfaces to the laboratory air. The figure very clearly illustrates initial build-up and then decay of radioactive daughter products of radioactive parent species.

4.4.2 REDETERMINATION OF BAROMETRIC DEPENDENCE OF COUNT RATE: BACKGROUND AND STANDARD VALUES

Sample counts were performed for a series of background, standard NBS Oxalic Acid preparations, and an intercalibration sample kindly donated by Dr. M. Stuiver previously calibrated both at the Universities of Washington and Miami laboratories (denoted QL #202 (University of Washington Quaternary Lab); ML #801 (Miami Lab); and OC-MSDL #I2 (Ocean Chemistry--Marine Sciences Directorate Lab # Intercalibration 2). Several of the Western Forest Products Lab (WFPL) wood samples from Table 9 were also recounted and will be reported at a later date.

The filling system was further modified to allow continuous monitor of sample pressure during counting and an accurate thermometer was located near the counter as a temporary substitute for future installation of digital thermometer temperature probes.

A composite of these results is presented with those recorded earlier in Tables 7 and 8 for which barometric data is available. Due to the absence of accurate temperature and pressure data for most of the earlier results (unknown reproducibility of "sample quantity" at normalized conditions,i.e., at 20°C and 1900 mm sample pressure) it is not possible to make an accurate quantitative assessment. However, a collection of data is plotted in Figures 33-41, showing a computer least-squares linear fit of the count rate versus barometric pressure. The computing was performed by Mr. Clifford Morgan of the Ocean Chemistry Division.

The data denoted "uncorrected" has not been normalized to standard quantity and, therefore, shows greater statistical variability than the data "corrected" for these parameters. The standard deviations in individual sample data is $\sqrt{N}/t$ (square root of the number of counts N, divided by the elapsed counting time, t) derived from Poisson Statistics. For background 3, where the elapsed counting time is not available, this value is replaced by 0.0 and a mean value $\sigma = 0.027$ cpm is chosen for a weekend count period approximating 2200 minutes ($\sigma = 0.037$ cpm was also applied to these values for later comparative purposes). The following summary describes the content of the data in the figures.

Figure	Description
Background 1	Cylinder CO_2 gas Samples 6 to 16
2	Cylinder CO_2 gas Sample 16-7*, 16-8, 16-9, 16-11
3	Marble CO_2 Samples 5,7,9,10
7	Marble CO_2 Samples 7-2 to 7-7 inclusive from the series in Background 3
9	Marble CO_2 Samples 9-1 to 9-5 from Background 3
10	Marble CO_2 Sample 10-1 to 10-5 from Background 3
16	Cylinder CO_2 gas sample 16-3 to 16-11 from both Background 1 and 2

Figure	Description
NBS Oxalic Acid Std	
#1	Oxalic Acid Sample 1-1 to 1-12
1,2	Oxalic Acid Samples 1 to 13 inclusive
3	Oxalic Acid Samples 9 to 13 inclusive
Intercalibration Sample QL-202	Oceanic CO_2 Sample

*Note: The samples are denoted by preparation number first followed by the number of successive times of repurification and counting; i.e., 16-7 is new preparation No. 16 and repurification plus recount No. 7 of Sample 16.

The standard error and significance of the linear term for the least squares linear fit are recorded on each figure along with the appropriate numerical data. The plots are characterized by the relationship: $y = A + Bx$ where A is the value of the count rate extrapolated to zero barometric pressure and B is the slope of the count rate vs barometric pressure relationship. The data is summarized in Table 10.

From the limited data available an estimate of the count rate dependence on barometric pressure for background, oxalic acid standard, and the intercalibration sample is:

$-0.4 \pm 0.3\%$, $-0.7 \pm 0.3\%$ and $-0.2 \pm 0.6\%$ respectively, resulting in a weighted mean value of $-0.4 \pm 0.4\%$

A systematic dependence of count rate vs. barometric pressure has been demonstrated with a dimension of sufficient magnitude to warrant correction of all future data. From Table 10 the barometrically corrected average value for count rates interpolated to an average regional value of 753 mm Hg pressure using both uncorrected and corrected sample quantity data are:

Sample	Cpm
Background	1.362 $\pm$ 0.037
NBS Oxalic Acid Standard	6.876 $\pm$ 0.078
Intercalibration Sample QL-202	6.664 $\pm$ 0.076

The QL-202 sample radiocarbon content measured by Dr. M. Stuiver of the Quaternary Research Radiocarbon Laboratory, University of Washington, is compared with the average value from this laboratory from the above data. The results are expressed as per mil ($^{o}/_{oo}$ = parts per thousand) differences from a standard:

$$\delta C^{14} = \left[\frac{A^*_{sample} - 0.95\ A^\circ_{standard}}{0.95\ A^\circ_{standard}} \right] X\ 1000$$

where A^*_{sample} is the net C-14 activity of the sample corrected for radioactive decay between the time of collection or formation and measurement, and $A^\circ_{standard}$ is the net C-14 activity of The National Bureau of Standards oxalic acid standard corrected for radioactive decay between January 1, 1958 and the time of measurement.

Measurement Laboratory	δC^{14} Value (not age corrected) QL-202
Stuiver	+ 13.1 $\pm$ 3.6‰
Ocean Chemistry-B.C. Research	+ 12.2 $\pm$ 5.5‰

The agreement is satisfactory as expected for an average of several determinations and, for the sample population used for the calculations, approximately 75% of the values lie within $\pm\ \sigma$ (standard deviation) of the best linear fit of the barometrically dependent data. Approximately 50% or greater of data uncorrected for sample quantity generally lies within

$\pm$ σ of the best linear fit of the barometrically dependent data for both background and NBS oxalic acid standards. This is markedly improved for the more recent corrected data, however, a complete statistical analysis will be forthcoming with accumulation of sufficient data. This will form a second report.

For a single determination of the QL-202 sample the δC^{14} value (not age corrected) is + 12.2 $\pm$ 15.4 ‰, and in general this magnitude of error is inherent in all sample activity measurements with the 0.4 liter counter for approximate 1000 minute count periods.

TABLE 1

	Item and Specifications	Quantity and Supplier
1.	Lead Bricks(2"x4"x8") (Standard Flat Type) Background count rate ~ 3.5 cpm/100 cm^2	St. Joe (Missouri) Doe Run Pig Lead (Lot D-128) 10054# + 4002# @ ~ \$28.80/cwt
2.	1943-44 Steel Plates (pre-atom bomb iron)	2 Plates 3/18" thick x 24" wide x 32" long @ \$0.06/lb. Capital Iron & Steels Metals Ltd. 1832 Store Street, Victoria (from the ship "Stettler")
3.	Paraffin(1-1/2"x9"x18"cakes)	Approximately 18 cakes Imperial Oil Ltd.
4.	30% Borated Polyethylene	Catalogue #210, 1"thick; outside rectangular dimensions 36"x18"x14" Reactor Experiments Inc. 963 Terminal Way San Carlos, California 94070
5.	Guard Ring Lead(Sweden) background count rate 0.07 cpm/100cm^2	Cylindrical dimensions ~ 1/2" thick (mean cylinder) diam. ~ 4" and 36" long: approx. 300 # @ \$0.16/lb Bolidens Gruvaktiobolag Stockholm O, Sturegaten 22, Sweden c/o Dr. J. A. Lowden, D.E.M.R. Geological Survey of Canada, 601 Booth Street, Ottawa, Ontario

TABLE 2

Item	No.	Description	Size	Material and Specs
1.	2	Vacuum Connector tubes	.250" OD. .032" W.Thk. x 2-5/8"	Copper OFHC
2.	8	Flathead Slot Dr. M/C Screws	#2 x 56 - N.C. X 3/8" L.G.	Stainless Steel A151 303
3.	2	O-ring	#2-242, #2-239 Parker	*(Viton), Rubber (Parker Seal Co.)
4.	1	Front End-Ring	5-3/4" OD. x 3/4" Thick 4(1/2" Long)	Stainless St. SAE 30-304
5.	8	Flathead Slot Dr. M/C Screws	#6 x 32 - N.C. x 1" Long	Stainless St. A151 303
6.	2	Insulator	5-1/4" OD x 3/4" Thick	Lucite
7.		0.002" Wire	0.002" x 50 ft. Long	Stainless St. (Sigmund Cohn)
8.	1	Innertube	4" OD x 5/8" W. Thk x ( )	Copper OFHC (or ASTM B75-62 or B42)
9.	1	Outertube	5-1/2" OD. x 259" W Thk. x ( )	" "
10.	1	Ring	4-7/8" OD. x 1/16" Thk	Stainless St. SAE 30 304
11.	1	Rear End Ring	5-1/4" OD. x 3/4" Thk.	Stainless St. SAE 30 304
12		Silver Solder		

TABLE 3

Item	No.	Description	Size	Material and Specs
1	1	Inner-tube	5.00" OD. x 0.156" Wall x 36"	OFHC COPPER (Approx. 27 lbs. @ $2.25/lb.)
2.	1	Outer-tube	6-1/2" OD. x 5/16" Wall x 36"	OFHC COPPER (Approx. 68 lbs. @ $1.70/lb.)
3.	2	Insulators	6" OD. x 3/4" Thick	Lucite
4.	2	O-ring		Rubber or Viton
5.	2	End Rings	6-3/4" OD. x 3/4" Thick	OFHC COPPER
			6-1/4" OD. x 3/4" Thick	"
6.	1	Ring	6" OD. x 1/16" Thick	OFHC COPPER (or St. St. SAE 30 304)
7.			12 ft. 1/4" OD.	OFHC COPPER TUBING

TABLE 4

C-14 ELECTRONICS LIST

COMPONENTS:

1) Counter HV DC Power Supply: Fluke Model 408B (Ser. # 1410).

2) Guard Ring HV DC Power Supply: Fluke Model 412B (Ser. # 3221).

3) Line Conditioner (Voltage Regulator): Sorenson ACR 2000 (Ser. # 1138).

4) Canberra Ind. Nuclear Instrument Parts (Assembled at La Jolla).

   i) Circuit Diagrams included here

   ii) Canberra Parts:

      a) 3 Scalars, Model 871 (Ser. No.'s 8994, 8995, 8996).

      b) 1 Preamp/Amp/Disc., Model 813 (Ser. # 89112).

      c) 1 Coincidence Unit, Model 1446 (Ser. # 8918).

      d) 1 Bin/Power Supply, Model 1400 (Ser. # 891128).

      e) 1 W.S.P.S. - 2 Post Amplifier and pulse shaping unit, (Designed and constructed at La Jolla).

5) Preamplifier - Kiethley Model 111 (Ser. # 's 63901, 63907).

   Kiethley Model 1081 (Ser. # 69758).

6) Esterline Angus 10 pen event recorder (Ser. # 804728).

7) Precision Instruments Timer.

TABLE 5

Uncorrected and Barometrically Corrected Plateau Characteristic Profile for Anthracite Coal CO_2 Background Preparation (1900mm Hg.)[2] (See figure 26)

Date	Aver. Barom. Press.			Counter HV					
		5100	5300	5400	5500	5600	5700	5800	5900
Mar. 13	29.640	0.935						2.32 (2.14)*	
Mar. 14									2.206 (2.087)*
Mar. 15									2.212 (2.093)
Mar. 16	29.435				2.414 (2.075)*				2.102 (2.211)*
Mar. 17	29.395				2.144 (1.830)*		2.238 (1.948)*		
Mar. 18	29.080					2.670 (2.162)*			1.944 (2.013)*
Mar. 19	29.322	0.904 (0.896)*	1.890 (1.504)*	2.037 (1.651)*				2.009 (1.940)*	
Mar. 20	29.335	0.927 (0.924)*						2.252 (1.868)*	
Mar. 21	29.410	1.045 (1.042)*						2.338 (1.986)*	
Averages*		0.954	1.504	1.651	1.953	(2.162)	1.948	2.009	2.101

(Minimum Countingtime 1000 min.)
*Barometrically Corrected Values to 29.921"Hg.

TABLE 6

Daily Counting Data For Two Counter and Effect of Partial Neutron Moderation and Variations in Barometric Pressure

Date	Pressure of CO_2 (mm)	Counting Time (min)	Ring Cosmics (cpm)	Counter HV (Volts)	Counter Cosmics (cpm)	Counter Bkgd. (cpm)	Bkgd. + C-14 (cpm)	Corr. C-14 (cpm)	Barom. Press. ("Hg)
1-LITER STAINLESS STEEL COUNTER									
Dec 8	1512	1245	353	5800	45	9.4			
9-10	1512	2685	357	5800	45	9.4			
11	1512	1038	367	5800	44.5	9.6			
Jan 4	1520	1000	365	5600	144		27.4		
0.4-LITER OFHC COPPER COUNTER									
Jan 30	800	1033	370	4000	64.6	2.20			
Feb 3	1520	2450	363	5000	61.2	2.15			
Feb 4	1520	1120	369	5000	60.7	2.11			
Feb 6	1520	1005	361	5000	60.3	2.17			30.29
Feb 11	2180	1900	371	5950	62.9	2.61			29.57
Feb 12	2180	654	368	5950	62.6	2.51			29.80
Feb 15	2280	1020	356	5950	58.7	2.15			30.32
Feb 16	2280	932	355	5950	57.6	2.03			30.35
Feb 18-19	2280	2250	360	5950	61.8		8.93		30.43
Feb 20	1868	876	350	5400	62.2		9.01		30.52
Feb 21-22	1868	2382	352	5400	62.1		8.96		30.39
Mar 2	1868	818	359	5400	60.2		8.48	(8.575)*	29.773
3	1868	726	363	5400	59.3		8.05	(8.320)*	29.500
4	1868	980	365	5400	59.3		8.17	(8.450)*	29.485
5	1868	590	363	5400	57.9		8.20	(8.502)*	29.450

*Barometrically Corrected

TABLE 6
CONTINUED

Date	Pressure Of CO_2 (mm)	Counting Time (min)	Ring Cosmics (cpm)	Counter HV (Volts)	Counter Cosmics (cpm)	Counter Bkgd. (cpm)	Bkgd. + C-14 (cpm)	Corr. C-14 (cpm)	Barom. Press. ("Hg)
BORATED POLYETHYLENE INSERTED (NO PARAFFIN)					99.995% CO_2				
Apr 5	1900	940	350	5800	61.71	1.879	(1.766)*		29.745
Apr 6	1900	911	351	5800	61.89	1.805	(1.704)*		29.763
Apr 7	1900	1174	346	5800	60.99	1.735	(1.778)*		29.988
Apr 8	1900	1662	348	5800	61.35	1.816	(1.783)*		29.870
Apr 9	1900	956	352	5800	62.07	1.854	(1.724)*		29.718
Apr 11	1900	983	351	5800	61.90	1.828	(1.714)*		29.744
Apr 16	1900	1350	354	5800	62.46	2.000	(1.718)*		29.482

TABLE 7

BACKGROUND CALIBRATION DATA

Date	Sample No.	Counting Period (Min.)	Lead Temp. (^{o}C)	Barometric Pressure ("Hg)	Counter Cosmics cpm	1/2 Plateau (Purity)	cpm Bkgd.	Aver.
May 23	Cyl #6-2	634	23.4	29.440	59.682	38.04	1.317	1.317
May 26	Cyl #9-1	400	23.7	29.583	59.610	31.20	1.335	
May 27	" "	640		29.622	58.802	30.90	1.350	
May 28	" "	2450	23.8	29.820	58.318	28.59	1.294*	
June 17	Cyl #9-4	2659	24.8	29.580	58.822	30.16	1.283*	
June 18	" "	1220	23.0	29.713	57.506	28.45	1.333*	
July 10	" #9-5	989		29.718	57.407	25.96*	(1.407*)	1.319
June 2	Cyl #10-1	1556	25.8	29.693	59.439	37.17	1.430	
June 4	" "	2295	24.7	29.755	58.475	34.51	1.326	
June 15	" #10-3	900	24.6	29.595	58.763	33.19	1.347	
June 21	" #10-4	961	26.0	29.765	57.418	25.81*	(1.427*)	
June 22	" #10-5	990	26.6	29.528	57.947	33.74	1.386	
June 24	" #10-6	2783	27.1	29.380	58.502	36.60	(1.434)	
June 25	" "	1056	24.2	29.570	58.183	33.21	(1.486)	
July 5	Cyl #10-7	922		29.713	58.322	32.60	1.358	1.369
July 2	Cyl #12-2	3036	26.6	(29.655)	57.773	35.68	(1.446)	
July 3	" "	827			57.654	34.89	1.395	
July 12	Cyl #12-3	975	26.0	29.905	55.863	30.23	1.374	
July 18	Cyl #12-4	982	26.8	29.575	56.889	28.77*	1.372*	1.380
July 19	Cyl #13-1	967	27.3	29.585	57.634	31.24	(1.547)	
July 20	Cyl #13-2	994	27.5	29.600	57.799	31.67	1.435	(1.435)
July 13	Marble # 2-1	940	26.2	29.830	56.265	29.25*	1.419*	
July 23	2-2	3854	24.7	29.658	58.232	30.31*	1.426*	
July 24	2-2	921	24.3	29.840	58.314	31.58	1.445	1.430

Note: Averages do not include bracketed values omitted because of known impurity or inconsistency in counting.

* = Slightly impure

Average (Without Marble) = 1.356 cpm
Average With Marble = 1.372 cpm
Mean 1.365.cpm

TABLE 8

Date	Sample No.	(min.) Counting Period	(^{o}C) Lead Temp.	(*Hg) Barometric Pressure	cpm Counter Cosmics	½ Plateau (Purity)	cpm C-14 + bkgd.	Average
May 29	NBS #1-1	936	24.7	29.808	63.438	39.52	6.614	
May 30	"	966	25.7	29.630	64.000	38.43	6.694	
May 31	"	936	25.6	"	64.283	36.94	6.699	
June 1	#1-2	937	25.8	---	65.142	40.40	6.814	
June 20	#1-4	1075	----	29.865	64.127	---	6.630	
June 26	#1-5	951	----	29.670	63.328	35.38	6.676	6.688
June 29	NBS #3-1	958	26.6	29.668	63.966	37.10	(7.090)	
Aug. 3	NBS #5-1	915	26.9	29.700	62.484	33.61	6.816	
Aug. 5	"	2833	27.0	---	62.357	---	6.769	
Aug. 6	"	1172	---	---	62.057	---	6.700	
Aug. 7	"	1318	25.8	29.610	62.193	32.30	6.731	6.754
Aug. 14	NBS #6-2	955	---	29.670	62.955	36.46	6.770	6.770
Aug. 13	NBS #7-1	2450		29.663	62.337	34.74	6.691	6.691
Aug. 17	NBS #8-1	970		29.650	63.795	37.47	(6.943)	
								6.726

95% (NBS Oxalic -bkgd.) = 5.092 cpm

TABLE 9

C-14 WOOD CALIBRATION DATA (MODERN TREE RING DATES)
Counter background=1.365 cpm (No barometric correction)
95% NBS Oxalic Acid Standard=bkgd.=5.092 cpm
No correction for coincidence loss, fractionation, etc.

Age=8032.9 ln 95%(NBS Oxalic-bkgd)/Sample x 1.03*
($T_{1/2}$=5568±40 yr.) * ($T_{1/2}$=5730±30 yr.)

Date	Sample No.	Growth from -to	Av. Ring Age A.D.	Age Before 1950	Barom. Press.	½ Plateau (purity)	Count Rate cpm	Aver. -bkgd	(C-14 Age before 1950) $T_{1/2}$=5568	$T_{1/2}$=5730
	WFPL #24	1800-1849	1825	125						
July 11	#1-1				29.843	35.56	6.425			
July 17	#1-2				29.573	37.54	6.466	5.080		
July 27	#2-1				29.755	33.07	6.588		-74	-76
Aug. 2	#2-2				29.750	30.25	6.537	5.293		
	WFPL #20	1600-1649	1625	325						
Aug. 18	#1-1				29.720	40.62	6.431		41	42
Nov. 14	#1-2				29.160	---	6.260			
	WFPL #14	1300-1349	1325	625						
Aug. 15	#1-1				29.700	45.16	6.116			
Aug. 16	#1-2				29.618	40.37	6.086	4.736	582	600
	GSC #22	1126-1130	1128	822						
July 31	#1-1				29.710	33.19	5.862	4.497		
Aug. 10	#1-2				29.683	33.67	6.216	4.851		
Aug. 20	#1-3				29.737	30.11	5.800	4.435	762	785
Aug. 21	#1-4-1				29.732	29.48	6.137			
Aug. 22	#1-4-2				29.730	39.15	6.068	4.742		
	WFPL#7	950-999	970	980	29.600	39.49	6.115			
June 28	#1-1				29.690	33.47	5.938			
July 6	#2-1				29.625	35.92	5.877	4.543	916	944
July 16	#2-2				29.665	(31.27)	(5.682)			
Aug. 8	WFPL #2	700-749	725	1225						
Aug. 8	#1-1				29.628	(26.41)	(5.781)	4.416	1144	1179

TABLE 10

Magnitude of Barometric Effect and Corrected Count Rates

	No. of Samples	B = Slope (= Significance of linear term)% Uncorrected	Average	Corrected	Average	% of Samples within σ of linear fit	cpm @ 753mm Average		
Bkgd 1	23	-0.64±0.67	-0.37±0.32			53%	1.362	1.361	1.362
2	24	-0.23±0.35	-0.37±0.30				1.351		
3	12			-0.48±0.98			1.354		
7	5			-0.02±1.6			1.346		
9	5	-0.34±1.3					1.302		
10	7	-0.90±1.1	-0.47± .30				1.386	1.355	
16	28	-0.35±0.30				53%	1.354		
NBS Oxalic 1	13	-1.55±1.09	-0.86±0.79			43%	6.817	6.826	6.876
2	15				0.66±0.32		6.874		
3	7			-0.65±0.47					
Sample QL-202 1	12	-0.06± .63					6.665	6.664	
2	7			-0.23±0.65		75%	6.662		

	Barometrically Corrected Av. cpm @ 753 mm	Simple Mean cpm Uncorrected Not Bar. Corr.	Simple Mean cpm Corrected Not Bar. Corr.
Bkgd	1.362	1.360±(59) 0.018	1.359±(12) 0.017
NBS Oxalic	6.876	6.898±0.076	6.899±0.076
Sample QL-202	6.664	6.663	6.674±0.082

TABLE 11

OPTIMUM OPERATING PARAMETERS

Precision Timer						
WSPS-2 RING	PAD DET.	DELAY	COINCIDENCE MODEL 1446	AC-1 Antico, Counter	TOTAL Counter Cosmics+ Sample	RING Guard Cosmics
0.74 Amp.Gain	2 Coarse Gain		1 Coinc. Events Req'd			
0.00 Disc.	2 Fine Gain		Output			
inv.			Out			
0.46 Width	7.50 Disc.		Anti			
			Coinc			
out Delay	Disc. Out		Out	5 Disc.	5 Disc.	5 Disc.
Pulse +			Out			

SORENSEN	AC REGULATOR ARC 1000
110 AC Volts	Power ON

FLUKE 412B VOLTAGE POWER SUPPLY(for Ring)	Polarity +
1100 +	

- 5600	
FLUKE HIGH VOLTAGE POWER SUPPLY	Polarity -
MODEL 408B Serial 1410	

TABLE 12

OCEAN CHEMISTRY, MARINE SCIENCES DIRECTORATE, RADIOCARBON ANALYSES AT B.C. RESEARCH

COUNT #1 Counter #_____ Sample # _____ Prep. # _____ Flask # _____ AC Tot CPM _____ + _____

Date__________ Time__________ Week Day__________

	Minutes	AC Tot	CC Tot	Ring Tot.	Wkg.Vltg.	Impur.Vltg.	Std. Wkg. Vltg.	Std.½Plat.Vltg.
	_____	_____	_____	_____	_____	_____	_____	_____
CPM		_____	_____	_____				
SIGMA ($\sqrt{N}/t$)		_____	_____	_____				

Fill Date________

	Temp.	Press.	Tot. Corr.	Quant.	Bar. Press.	Av. Bar. Press.	½Plat. Vltg.
Orig.Fill Data	_____	_____	_____	_____	_____	_____	_____
Final Fill Data	_____	_____	_____	_____	_____	Avg. Fill Quant _____	_____
						Bar. Corr. Avg. Fill Quant _____	

Prep. Date______ Prep. Steps______ Comments______________________________

Small Del C-14 ($^{o}/oo$) _____ ± _____

Measured Rel. C-14 Activity: ($^{o}/o$) _____ ± _____

Stnd. NBS Value _____ + _____ Stnd. Bkgd. Value _____ ± _____

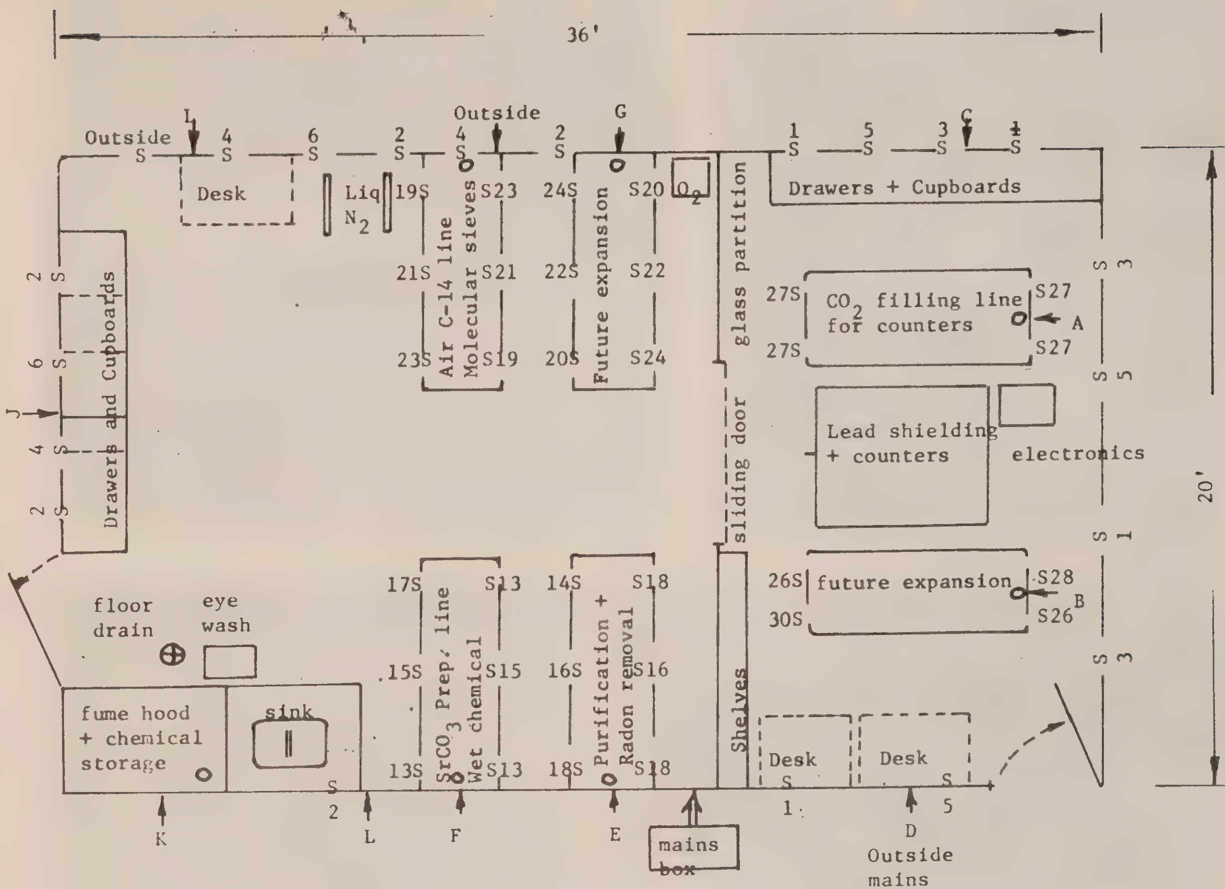
C-13 Sample # _____

Comments on Counting______________________________

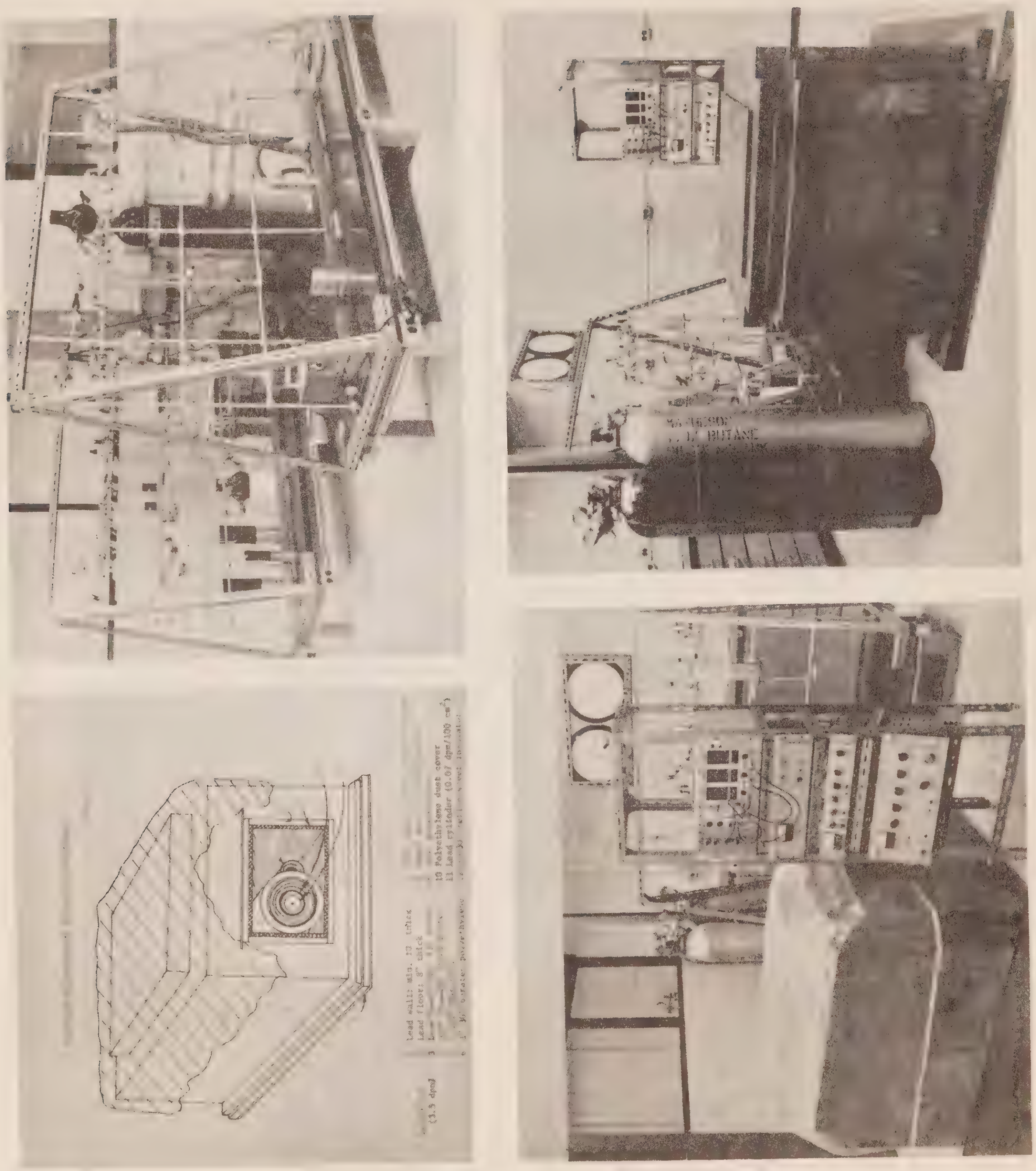
COUNT #2 (Duplicate of above format)

RADIOCARBON DATING LABORATORY FLOOR PLAN

Fig. 1

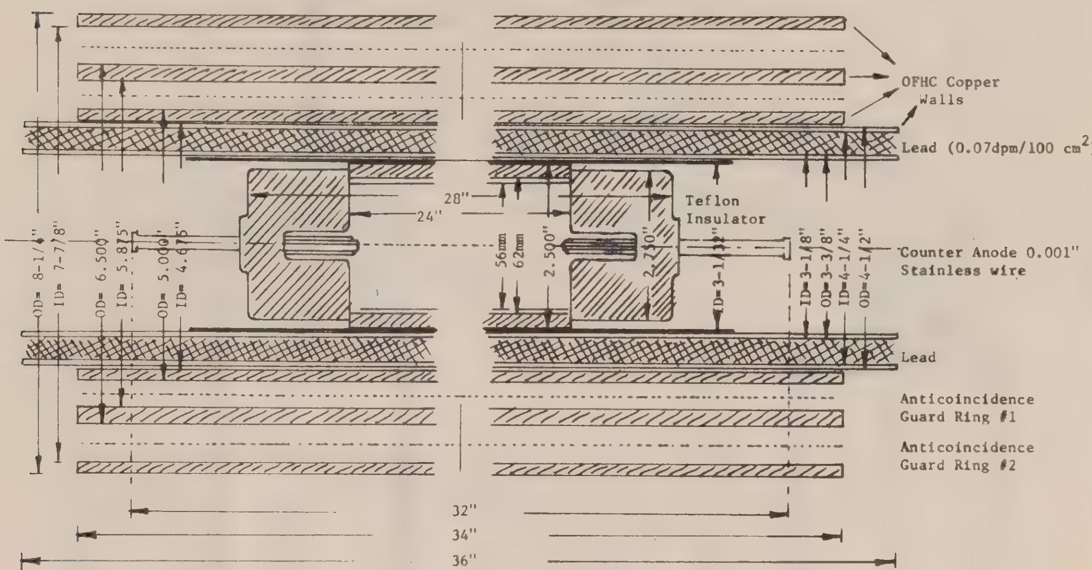


Water	↑
Cupsink	o
Electrical sockets	S (15 amp line)
Outside Mains	Capital Letters
Floor drain	⊕


10 Polyethylene dust cover
11 Lead cylinder (0.07 dpm/100 cm²)
BUTANE

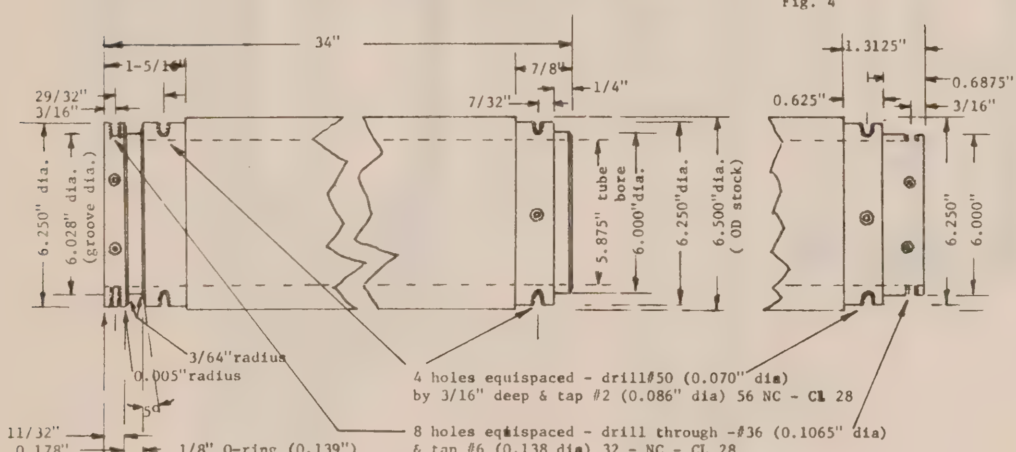
DOUBLE ANTICOINCIDENCE GUARD RING, LEAD SHIELDING, & PROPORTIONAL COUNTER ASSEMBLY

(Scale = 1:2) Fig. 3



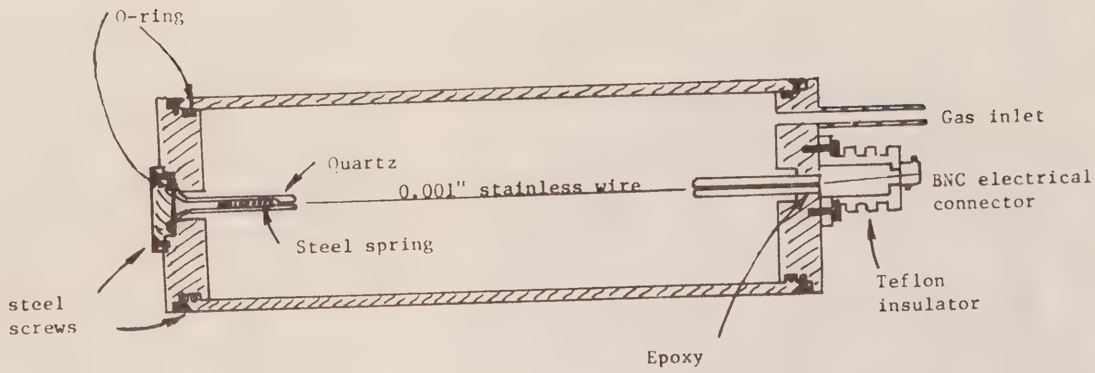
34" MULTIANODE CYLINDRICAL GUARD RING DESIGN

Fig. 4



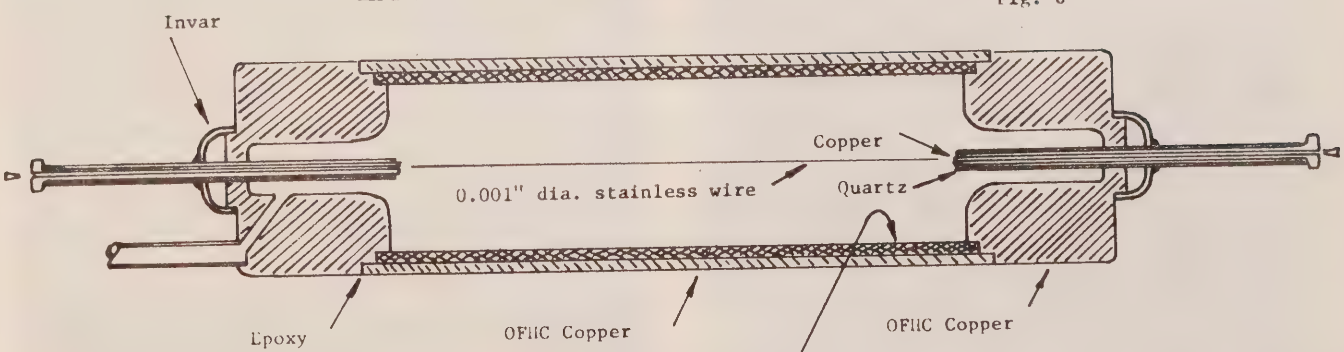
BIEN-TYPE 1-LITER STAINLESS STEEL COUNTER

Fig. 5



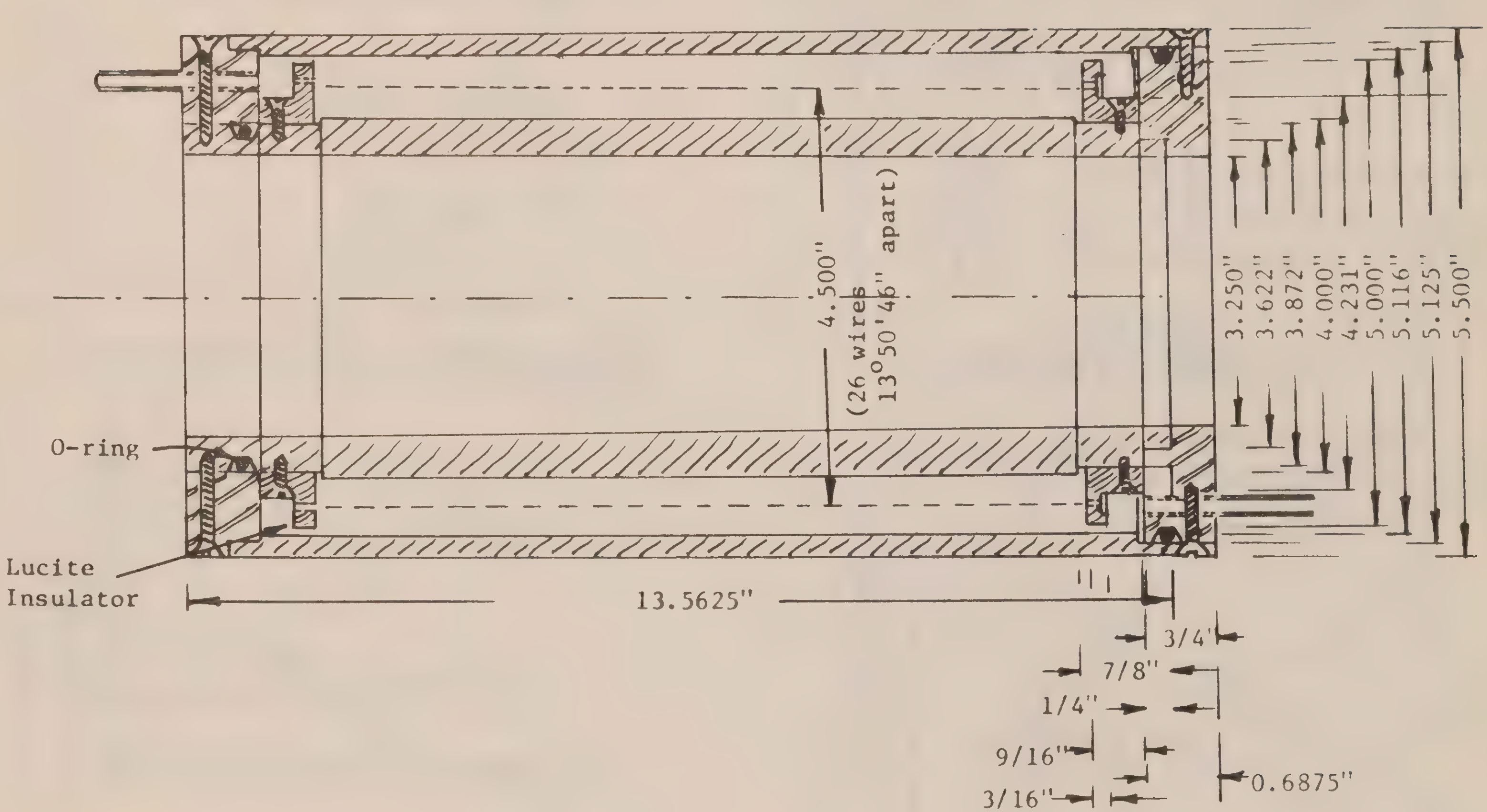
STUIVER DESIGN C-14 PROPORTIONAL GAS COUNTER

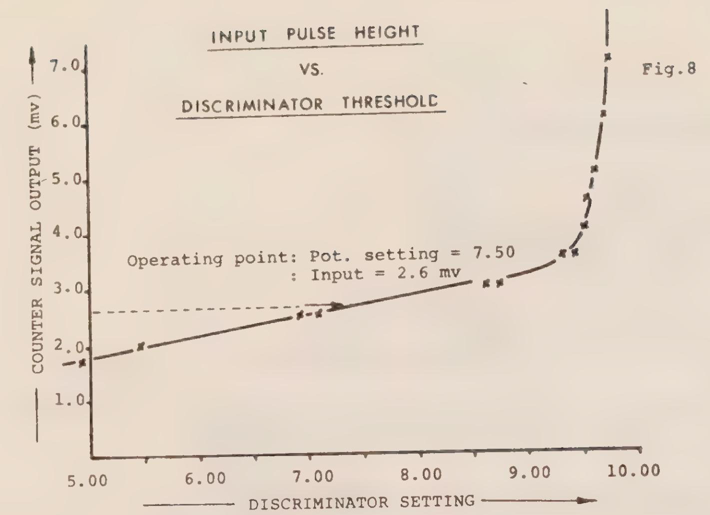
Fig. 6

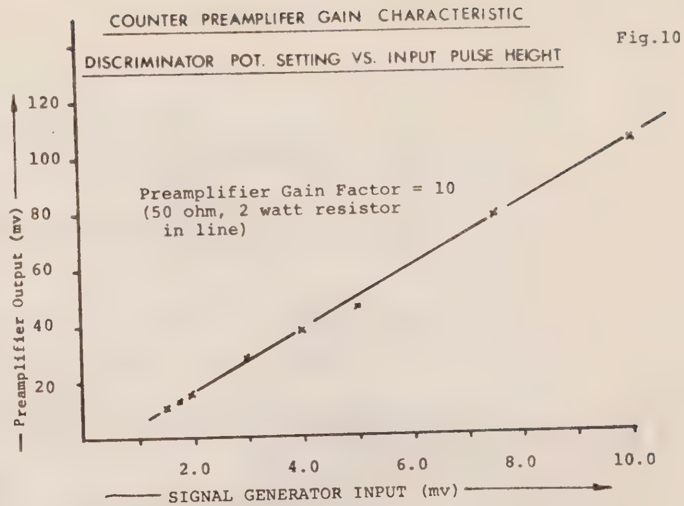


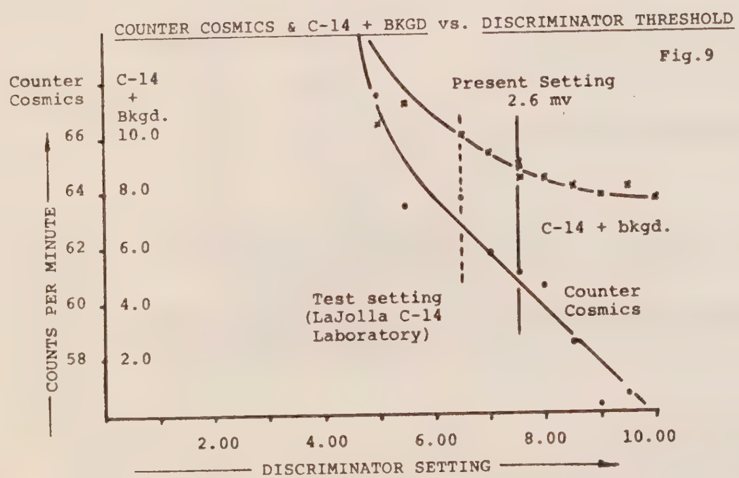
0.4 LITER COUNTER ANTICOINCIDENCE GUARD RING ASSEMBLY

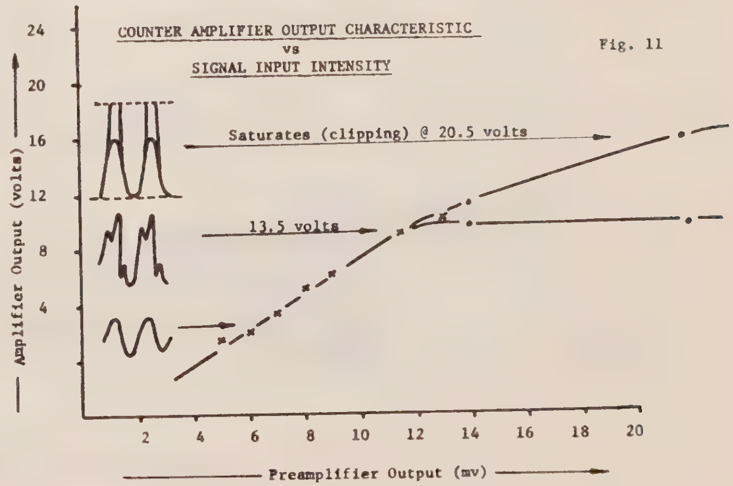
Fig. 7




INPUT PULSE HEIGHT
VS.
DISCRIMINATOR THRESHOLD
Fig.8
Operating point: Pot. setting = 7.50
: Input = 2.6 mv
COUNTER SIGNAL OUTPUT (mv)
7.0
6.0
5.0
4.0
3.0
2.0
1.0
5.00
6.00
7.00
8.00
9.00
10.00
DISCRIMINATOR SETTING


COUNTER PREAMPLIFER GAIN CHARACTERISTIC
DISCRIMINATOR POT. SETTING VS. INPUT PULSE HEIGHT
Fig.10
Preamplifier Gain Factor = 10
(50 ohm, 2 watt resistor
in line)
Preamplifier Output (mv)
120
100
80
60
40
20
2.0
4.0
6.0
8.0
10.0
SIGNAL GENERATOR INPUT (mv)

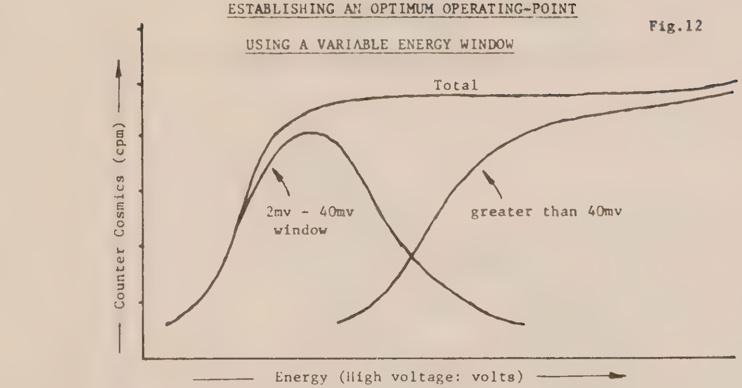

COUNTER COSMICS & C-14 + BKGD vs. DISCRIMINATOR THRESHOLD
Fig.9
Counter Cosmics
C-14 + Bkgd.
66
64
62
60
58
10.0
8.0
6.0
4.0
2.0
Present Setting
2.6 mv
C-14 + bkgd.
Test setting
(LaJolla C-14
Laboratory)
Counter
Cosmics
COUNTS PER MINUTE
2.00
4.00
6.00
8.00
10.00
DISCRIMINATOR SETTING


COUNTER AMPLIFIER OUTPUT CHARACTERISTIC
vs
SIGNAL INPUT INTENSITY
Fig. 11
Saturates (clipping) @ 20.5 volts
13.5 volts
Amplifier Output (volts)
24
20
16
12
8
4
2
4
6
8
10
12
14
16
18
20
Preamplifier Output (mv)

ESTABLISHING AN OPTIMUM OPERATING-POINT

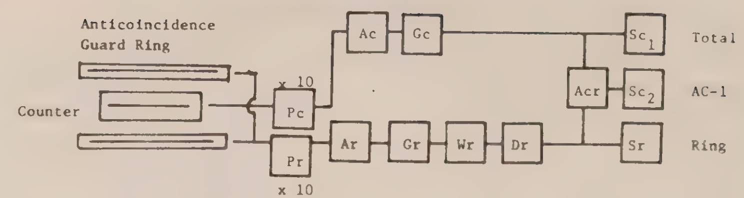
USING A VARIABLE ENERGY WINDOW

Fig.12



ELECTRONIC FLOW DIAGRAM

Fig. 14



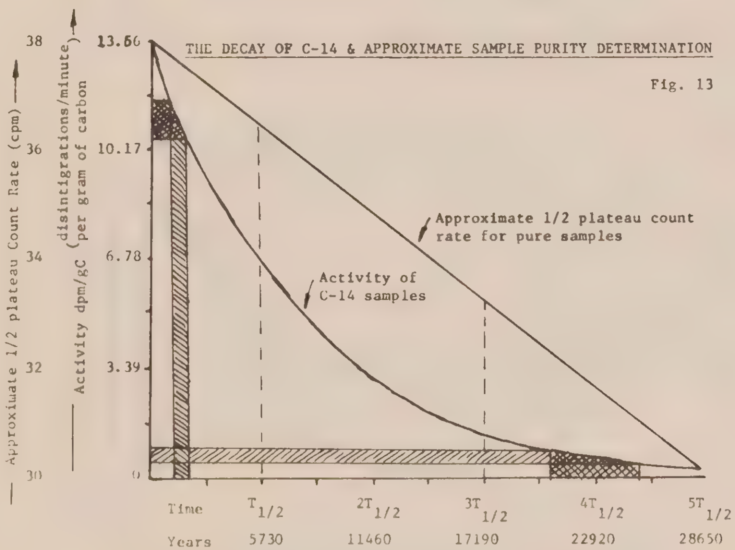
C : Counter
R : Ring

P : Preamplifier
G : Discriminator Gate

A : Amplifier - Pulse Shaping Unit
W : Variable Width Gate
D : Delay
Acr : Anticoincidence
S : Scalar Readout

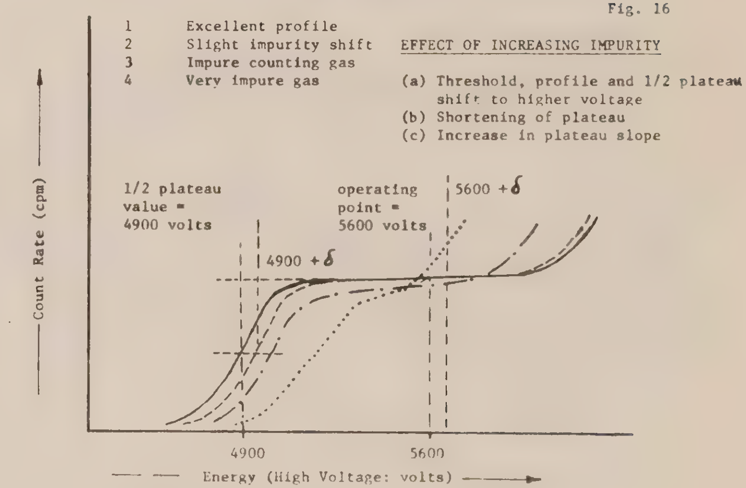
THE DECAY OF C-14 & APPROXIMATE SAMPLE PURITY DETERMINATION

Fig. 13



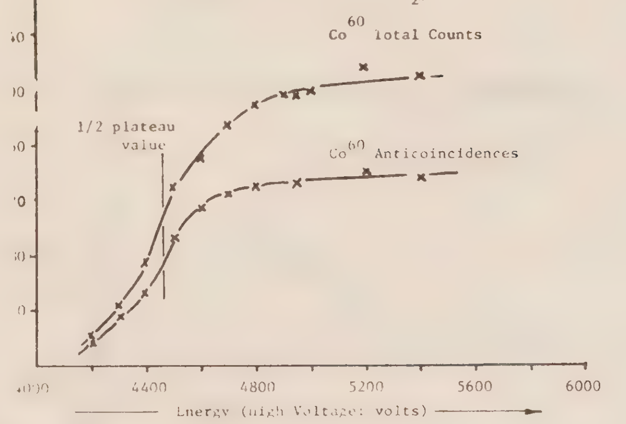
PURITY CRITERIA EFFECTS ON CHARACTERISTIC PROFILE

Fig. 16



Co^{60} (0.5 micro curries) CHARACTERISTIC PROFILES

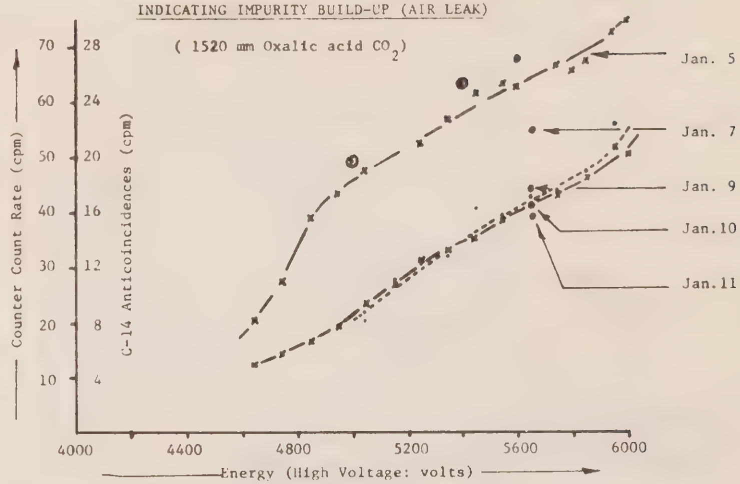
(1530 mm, 99.995% purity CO_2) Fig. 15



BIEN-TYPE STAINLESS STEEL 1 LITER COUNTER PROFILE

INDICATING IMPURITY BUILD-UP (AIR LEAK) Fig. 18

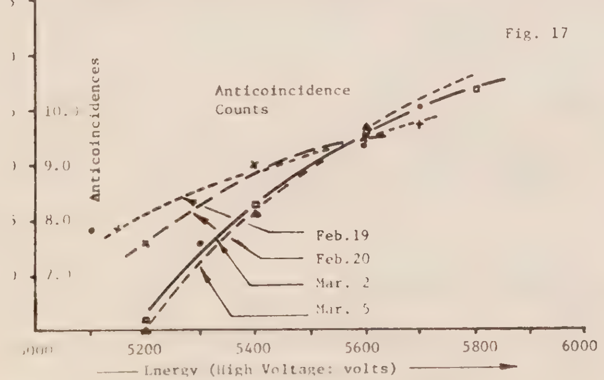
(1520 mm Oxalic acid CO_2)



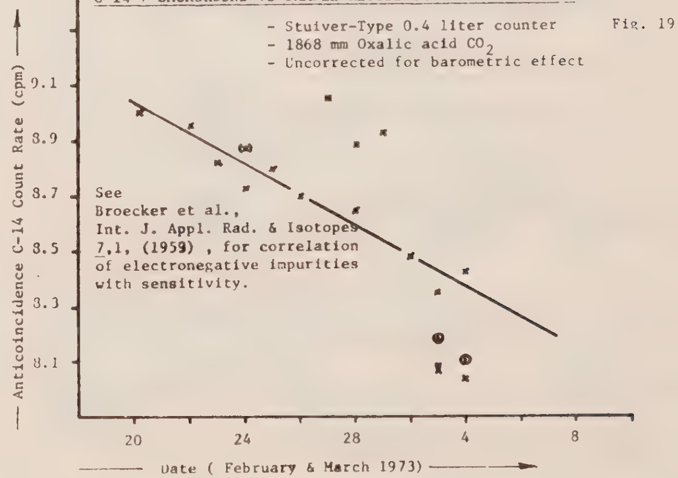
COUNT RATE vs ENERGY (HV = HIGH VOLTAGE)

PLATEAU SLOPE VARIATION WITH SAMPLE RESIDENCE TIME IN COUNTER

Fig. 17

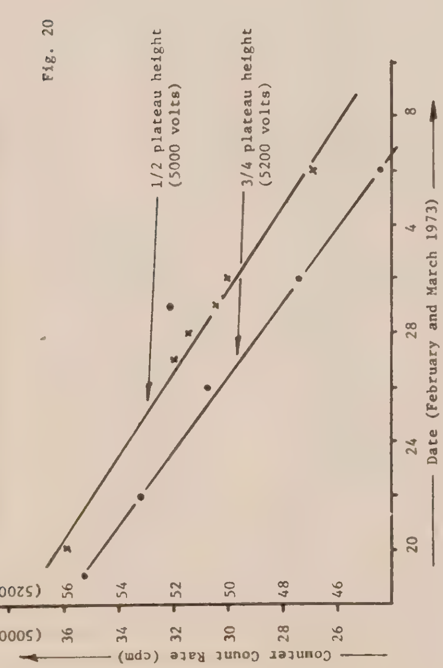


C-14 + BACKGROUND vs SAMPLE RESIDENCE TIME IN COUNTER

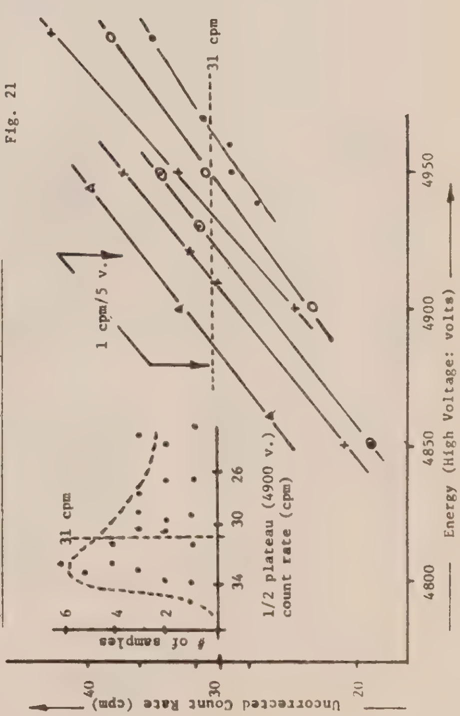


1/2 & 3/4 PLATEAU HEIGHT

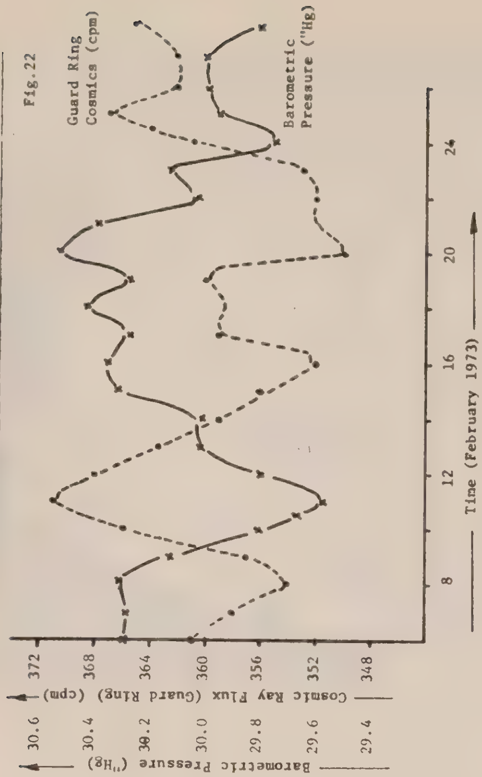
VARIATION WITH SAMPLE RESIDENCE TIME IN COUNTER



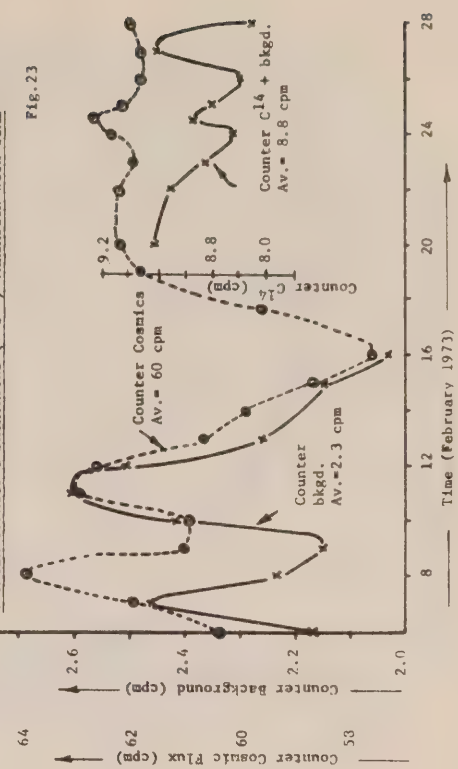
1/2 PLATEAU COUNT RATE (PURITY) vs ENERGY



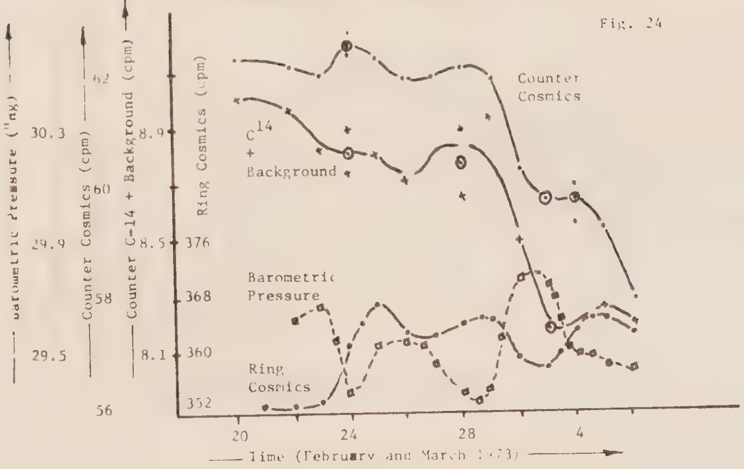
INVERSE RELATIONSHIP OF COSMIC RAY FLUX vs BAROMETRIC PRESSURE



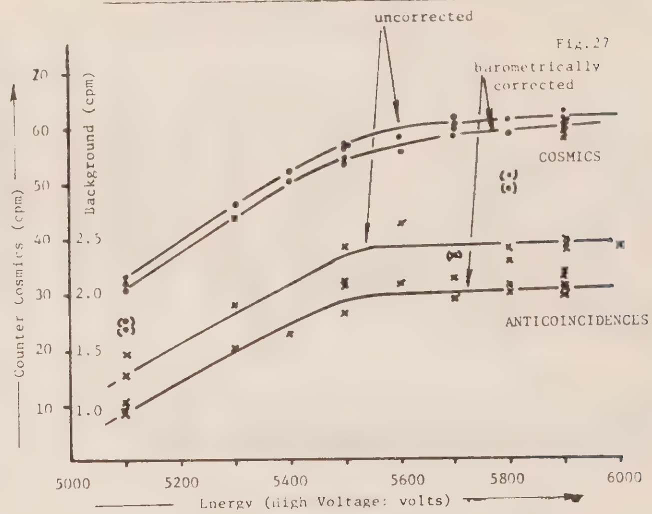
COUNTER COSMICS & BACKGROUND (+ C^{14}) VARIATION WITH TIME



COUNTER COSMICS, C^{14}, BAROMETRIC PRESSURE vs TIME

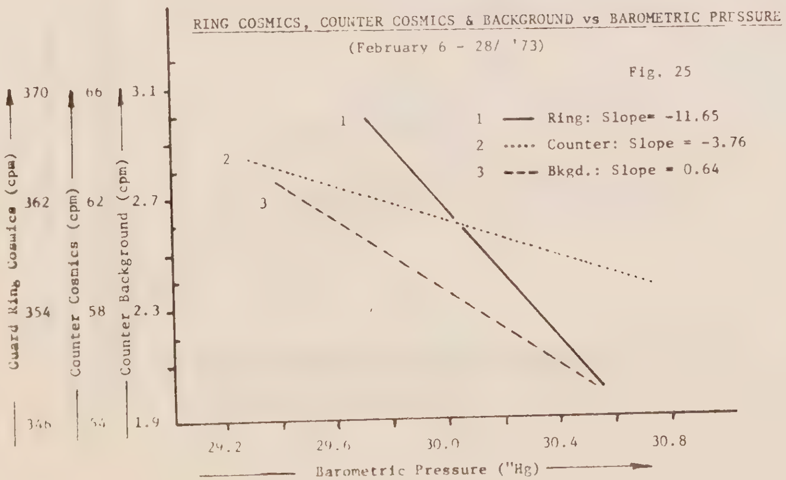


BAROMETRIC CORRECTION OF COUNTER PROFILE CHARACTERISTIC

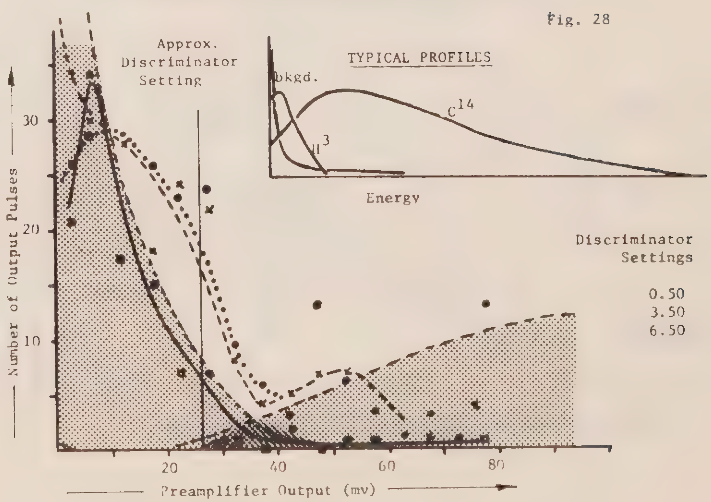


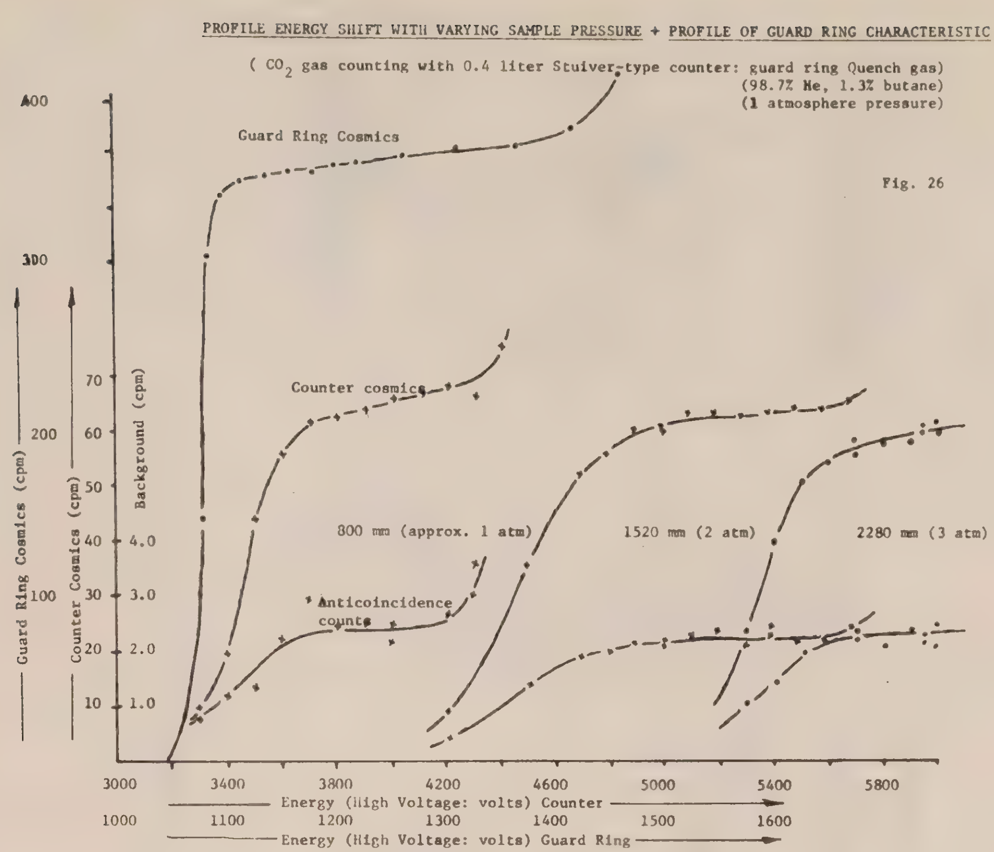
RING COSMICS, COUNTER COSMICS & BACKGROUND vs BAROMETRIC PRESSURE

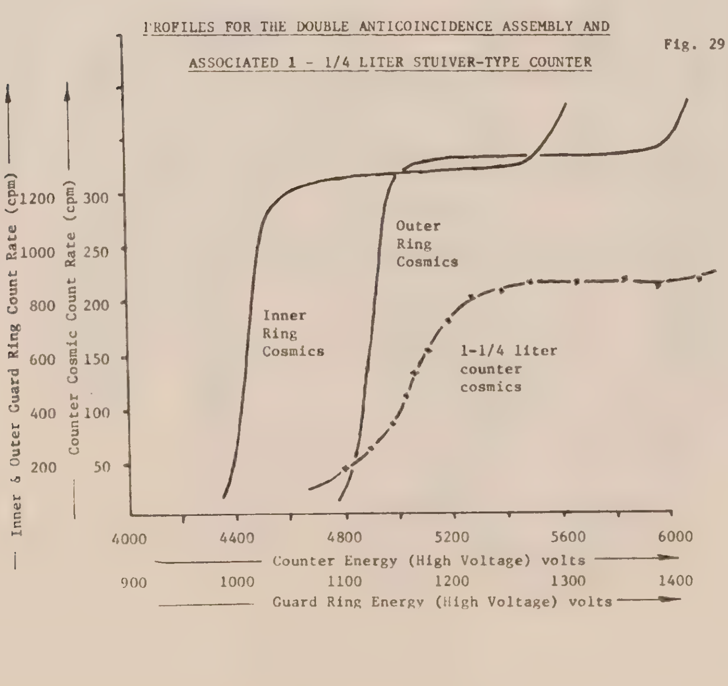
(February 6 - 28/ '73)



HISTOGRAM OF COUNTER PREAMPLIFIER OUTPUT

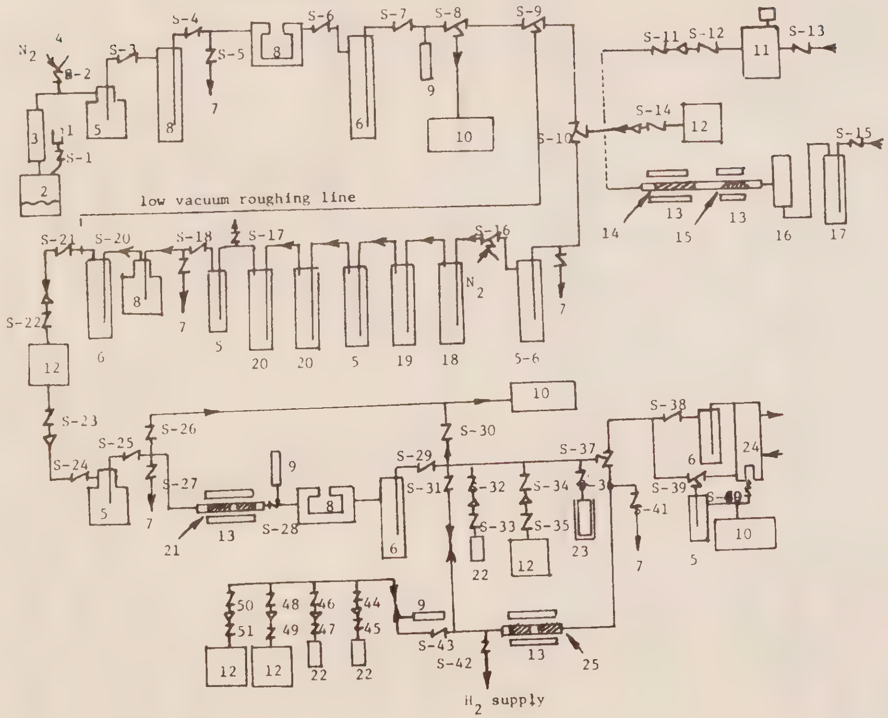



PROFILE ENERGY SHIFT WITH VARYING SAMPLE PRESSURE + PROFILE OF GUARD RING CHARACTERISTIC
(CO_2 gas counting with 0.4 liter Stuiver-type counter: guard ring Quench gas)
(98.7% He, 1.3% butane)
(1 atmosphere pressure)
Fig. 26
Guard Ring Cosmics
Counter cosmics
Anticoincidence counts
800 mm (approx. 1 atm)
1520 mm (2 atm)
2280 mm (3 atm)
Guard Ring Cosmics (cpm)
Counter Cosmics (cpm)
Background (cpm)
400
300
200
100
70
60
50
40
30
20
10
4.0
3.0
2.0
1.0
3000
3400
3800
4200
4600
5000
5400
5800
Energy (High Voltage: volts) Counter
1000
1100
1200
1300
1400
1500
1600
Energy (High Voltage: volts) Guard Ring


PROFILES FOR THE DOUBLE ANTICOINCIDENCE ASSEMBLY AND
ASSOCIATED 1 - 1/4 LITER STUIVER-TYPE COUNTER
Fig. 29
Outer Ring Cosmics
Inner Ring Cosmics
1-1/4 liter counter cosmics
Inner & Outer Guard Ring Count Rate (cpm)
Counter Cosmic Count Rate (cpm)
1200
1000
800
600
400
200
300
250
200
150
100
50
4000
4400
4800
5200
5600
6000
Counter Energy (High Voltage) volts
900
1000
1100
1200
1300
1400
Guard Ring Energy (High Voltage) volts

CARBON DIOXIDE PREPARATION & PURIFICATION SYSTEM

Fig.30

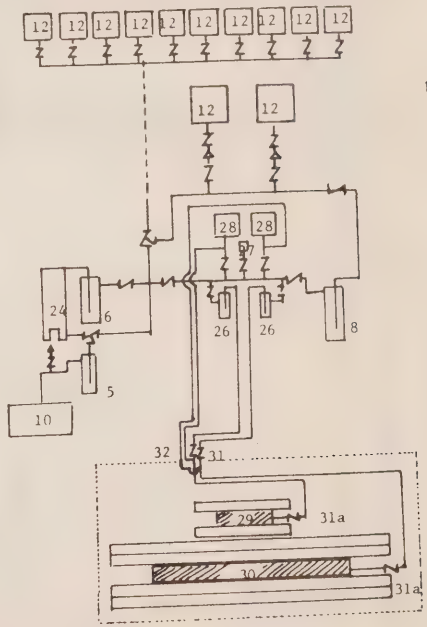


1. H_3PO_4 (or $KMnO_4$)
2. Carbonate or Oxalic
3. Condenser
4. N_2 purge
5. Ballast bulb
6. Liquid N_2 trap
7. Manometer
8. Dry ice trap
9. Pirani guage
10. Forepump
11. Parr bomb (combustion)
12. Storage flask
13. Furnace
14. CuO at 650°C
15. Sample
16. $CaCl_2$ or $CaSO_4$
17. 10% NaOH
18. Dilute H_2SO_4
19. 0.1N $AgNO_3$ in HNO_3
20. Dilute H_2SO_4 sat. CrO_3
21. Pt-Asbestos-Ag @ 420°C
22. C-13 sample
23. Radon removal trap
24. Hg diffusion pump
25. Cu + Ag @ 420 C
26. Freezeout traps
27. Variable volume valve
28. Heise pressure gauge
29. 0.4 liter counter
30. 1-1/4 liter counter
31. Bellows valves
31a. Toggle valves

S- : Vacuum stopcocks

CARBON DIOXIDE STORAGE & COUNTER FILLING SYSTEM

Fig.31



VARIATION OF COUNTER BACKGROUND WITH TIME IMMEDIATELY AFTER ACID WASHING & RESTRINGING

(RADON DECAY CURVE)

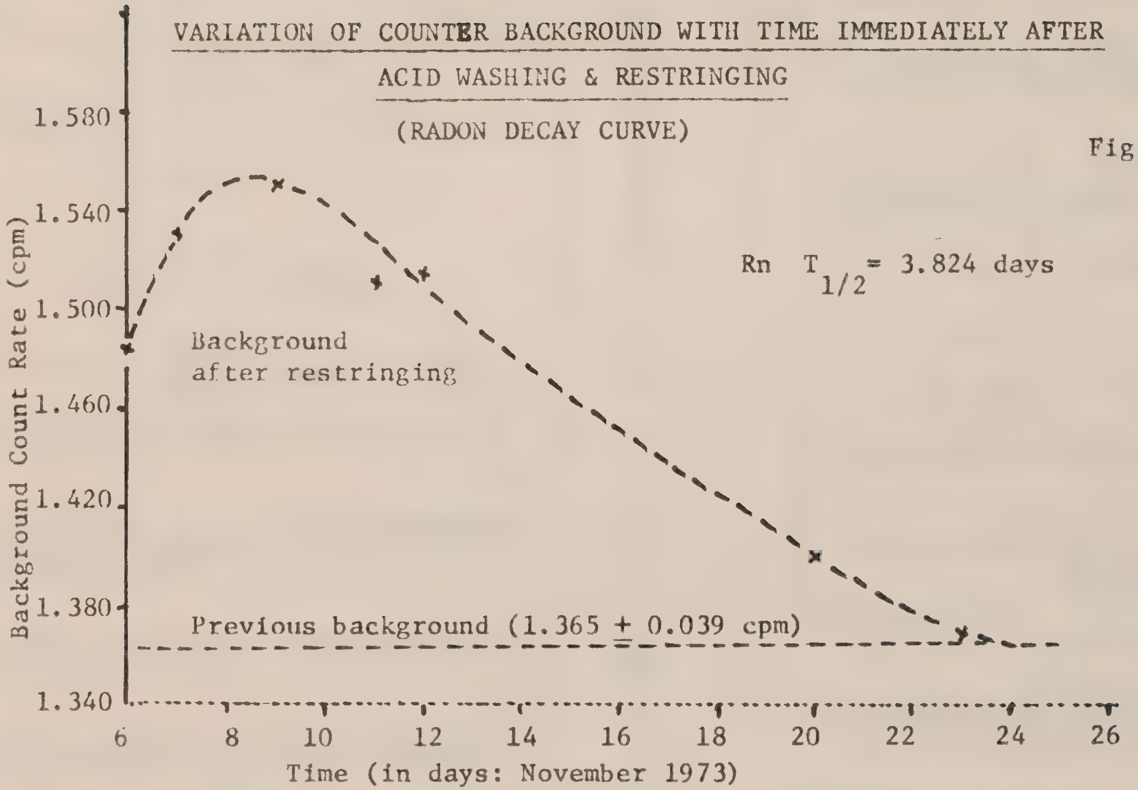
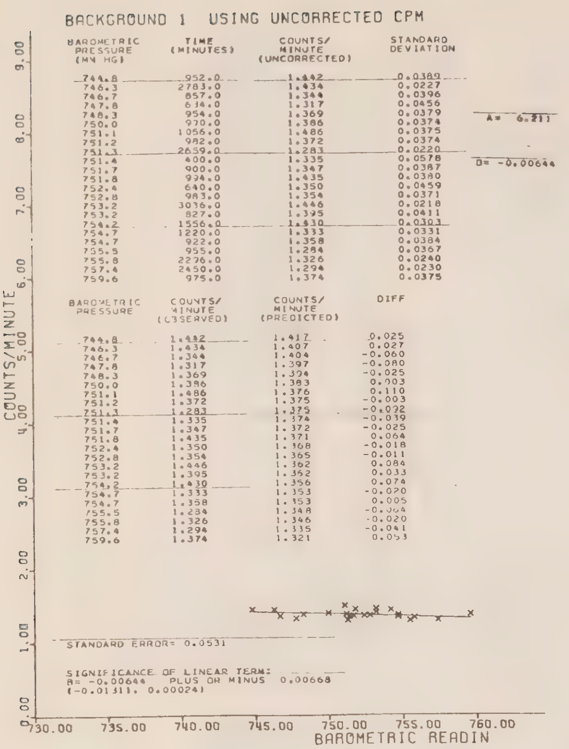


Fig. 32



BACKGROUND 1 USING UNCORRECTED CPM

BAROMETRIC PRESSURE (MM HG)	TIME (MINUTES)	COUNTS/ MINUTE (UNCORRECTED)	STANDARD DEVIATION
744.8	952.0	1.442	0.0389
746.3	2783.0	1.434	0.0227
746.7	857.0	1.344	0.0396
747.8	634.0	1.317	0.0456
748.3	954.0	1.369	0.0379
750.0	970.0	1.386	0.0374
751.1	1056.0	1.486	0.0375
751.2	982.0	1.372	0.0374
751.3	2659.0	1.283	0.0220
751.4	400.0	1.335	0.0578
751.7	900.0	1.347	0.0387
751.8	934.0	1.435	0.0380
752.4	640.0	1.350	0.0459
752.8	983.0	1.354	0.0371
753.2	3036.0	1.446	0.0218
753.2	827.0	1.395	0.0411
754.2	1556.0	1.430	0.0303
754.7	1220.0	1.333	0.0331
754.7	922.0	1.358	0.0384
755.5	955.0	1.284	0.0367
755.8	2276.0	1.326	0.0240
757.4	2450.0	1.294	0.0230
759.6	975.0	1.374	0.0375

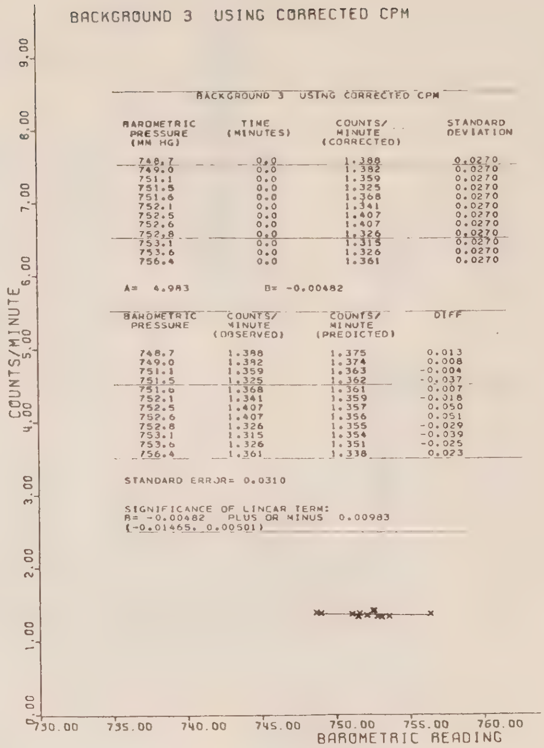
A= 6.211

B= -0.00644

BAROMETRIC PRESSURE	COUNTS/ MINUTE (OBSERVED)	COUNTS/ MINUTE (PREDICTED)	DIFF
744.8	1.442	1.417	0.025
746.3	1.434	1.407	0.027
746.7	1.344	1.404	-0.060
747.8	1.317	1.397	-0.080
748.3	1.369	1.394	-0.025
750.0	1.386	1.383	0.003
751.1	1.486	1.376	0.110
751.2	1.372	1.375	-0.003
751.3	1.283	1.375	-0.092
751.4	1.335	1.374	-0.039
751.7	1.347	1.372	-0.025
751.8	1.435	1.371	0.064
752.4	1.350	1.368	-0.018
752.8	1.354	1.365	-0.011
753.2	1.446	1.362	0.084
753.2	1.395	1.362	0.033
754.2	1.430	1.356	0.074
754.7	1.333	1.353	-0.020
754.7	1.358	1.353	0.005
755.5	1.284	1.348	-0.064
755.8	1.326	1.346	-0.020
757.4	1.294	1.335	-0.041
759.6	1.374	1.321	0.053

STANDARD ERROR= 0.0531

SIGNIFICANCE OF LINEAR TERM:
B= -0.00644 PLUS OR MINUS 0.00668
(-0.01311, 0.00024)



BACKGROUND 3 USING CORRECTED CPM

BACKGROUND 3 USING CORRECTED CPM

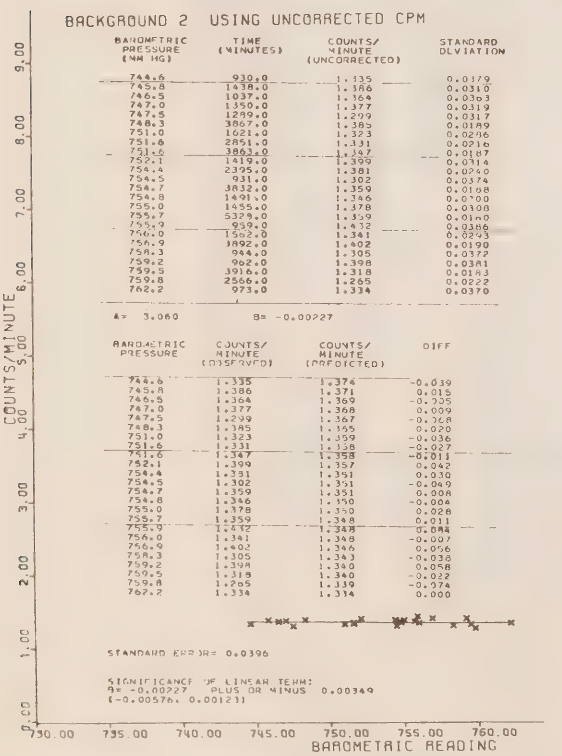
BAROMETRIC PRESSURE (MM HG)	TIME (MINUTES)	COUNTS/ MINUTE (CORRECTED)	STANDARD DEVIATION
748.7	0.0	1.388	0.0270
749.0	0.0	1.382	0.0270
751.1	0.0	1.359	0.0270
751.5	0.0	1.325	0.0270
751.6	0.0	1.368	0.0270
752.1	0.0	1.341	0.0270
752.5	0.0	1.407	0.0270
752.6	0.0	1.407	0.0270
752.8	0.0	1.326	0.0270
753.1	0.0	1.315	0.0270
753.6	0.0	1.326	0.0270
756.4	0.0	1.361	0.0270

A= 4.983 B= -0.00482

BAROMETRIC PRESSURE	COUNTS/ MINUTE (OBSERVED)	COUNTS/ MINUTE (PREDICTED)	DIFF
748.7	1.388	1.375	0.013
749.0	1.382	1.374	0.008
751.1	1.359	1.363	-0.004
751.5	1.325	1.362	-0.037
751.6	1.368	1.361	0.007
752.1	1.341	1.359	-0.018
752.5	1.407	1.357	0.050
752.6	1.407	1.356	0.051
752.8	1.326	1.355	-0.029
753.1	1.315	1.354	-0.039
753.6	1.326	1.351	-0.025
756.4	1.361	1.338	0.023

STANDARD ERROR= 0.0310

SIGNIFICANCE OF LINEAR TERM:
B= -0.00482 PLUS OR MINUS 0.00983
(-0.01465, 0.00501)



BACKGROUND 2 USING UNCORRECTED CPM

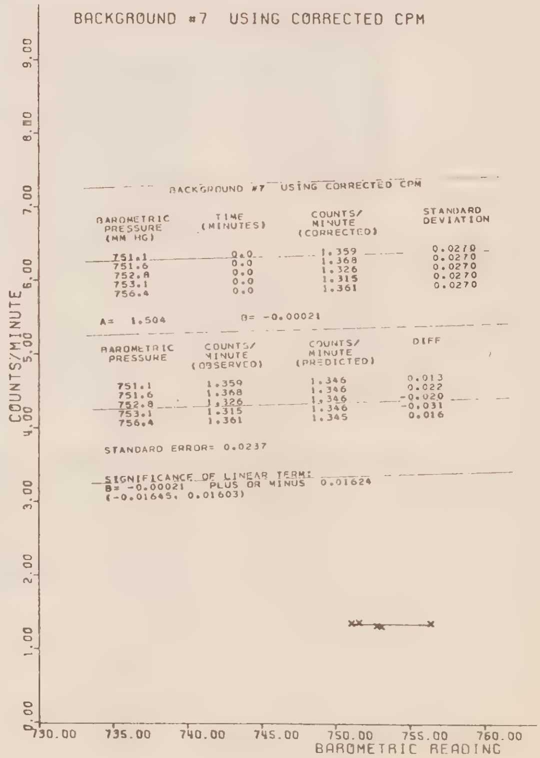
BAROMETRIC PRESSURE (MM HG)	TIME (MINUTES)	COUNTS/ MINUTE (UNCORRECTED)	STANDARD DEVIATION
744.6	930.0	1.335	0.0379
745.8	1438.0	1.386	0.0310
746.5	1037.0	1.364	0.0363
747.0	1350.0	1.377	0.0319
747.5	1299.0	1.299	0.0317
748.3	3867.0	1.385	0.0189
751.0	1621.0	1.323	0.0286
751.6	2851.0	1.331	0.0216
751.6	3863.0	1.347	0.0187
752.1	1419.0	1.399	0.0314
754.4	2395.0	1.381	0.0240
754.5	931.0	1.302	0.0374
754.7	3832.0	1.359	0.0188
754.8	1491.0	1.346	0.0300
755.0	1455.0	1.378	0.0308
755.7	5329.0	1.359	0.0160
755.9	959.0	1.432	0.0386
756.0	1562.0	1.341	0.0293
756.9	3892.0	1.402	0.0190
758.3	944.0	1.305	0.0372
759.2	962.0	1.398	0.0381
759.5	3916.0	1.318	0.0183
759.8	2566.0	1.265	0.0222
762.2	973.0	1.334	0.0370

A= 3.060 B= -0.00227

BAROMETRIC PRESSURE	COUNTS/ MINUTE (OBSERVED)	COUNTS/ MINUTE (PREDICTED)	DIFF
744.6	1.335	1.374	-0.039
745.8	1.386	1.371	0.015
746.5	1.364	1.369	-0.005
747.0	1.377	1.368	0.009
747.5	1.299	1.367	-0.068
748.3	1.385	1.365	0.020
751.0	1.323	1.359	-0.036
751.6	1.331	1.358	-0.027
751.6	1.347	1.358	-0.011
752.1	1.399	1.357	0.042
754.4	1.381	1.351	0.030
754.5	1.302	1.351	-0.049
754.7	1.359	1.351	0.008
754.8	1.346	1.350	-0.004
755.0	1.378	1.350	0.028
755.7	1.359	1.348	0.011
755.9	1.432	1.348	0.084
756.0	1.341	1.348	-0.007
756.9	1.402	1.346	0.056
758.3	1.305	1.343	-0.038
759.2	1.398	1.340	0.058
759.5	1.318	1.340	-0.022
759.8	1.265	1.339	-0.074
762.2	1.334	1.334	0.000

STANDARD ERROR= 0.0396

SIGNIFICANCE OF LINEAR TERM:
B= -0.00227 PLUS OR MINUS 0.00349
(-0.00576, 0.00123)



BACKGROUND #7 USING CORRECTED CPM

BACKGROUND #7 USING CORRECTED CPM

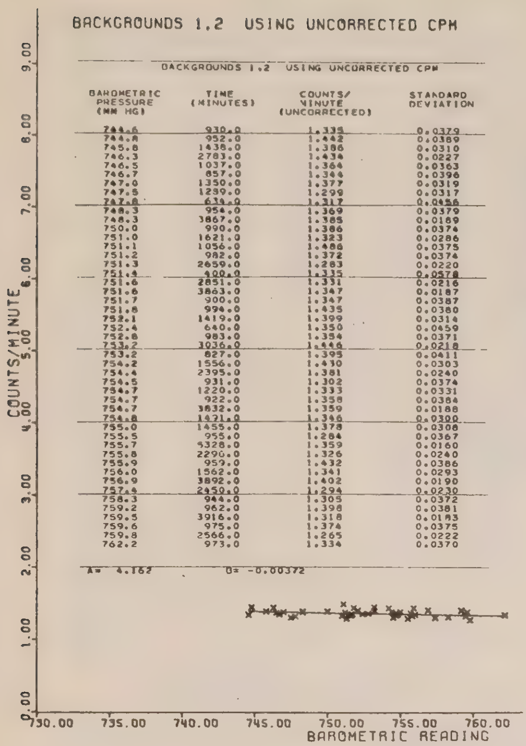
BAROMETRIC PRESSURE (MM HG)	TIME (MINUTES)	COUNTS/ MINUTE (CORRECTED)	STANDARD DEVIATION
751.1	0.0	1.359	0.0270
751.6	0.0	1.368	0.0270
752.8	0.0	1.326	0.0270
753.1	0.0	1.315	0.0270
756.4	0.0	1.361	0.0270

A= 1.504 B= -0.00021

BAROMETRIC PRESSURE	COUNTS/ MINUTE (OBSERVED)	COUNTS/ MINUTE (PREDICTED)	DIFF
751.1	1.359	1.346	0.013
751.6	1.368	1.346	0.022
752.8	1.326	1.346	-0.020
753.1	1.315	1.346	-0.031
756.4	1.361	1.345	0.016

STANDARD ERROR= 0.0237

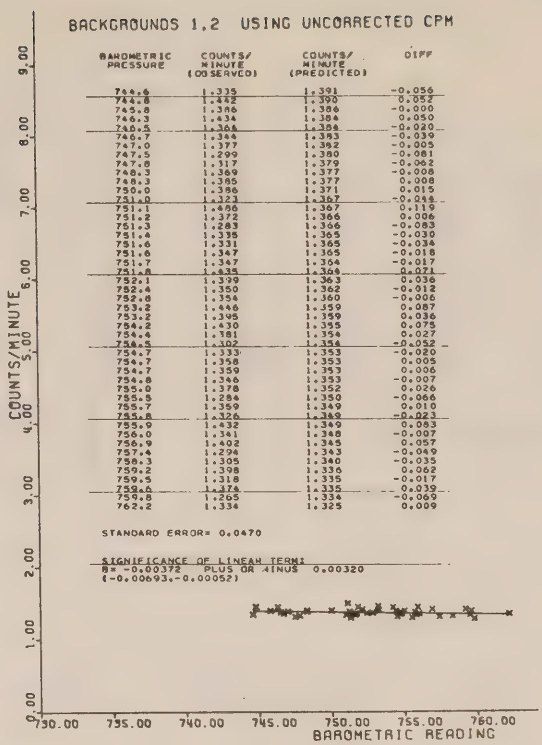
SIGNIFICANCE OF LINEAR TERM:
B= -0.00021 PLUS OR MINUS 0.01624
(-0.01645, 0.01603)



BACKGROUNDS 1.2 USING UNCORRECTED CPM

BAROMETRIC PRESSURE (MM HG)	TIME (MINUTES)	COUNTS/ MINUTE (UNCORRECTED)	STANDARD DEVIATION
744.6	930.0	1.335	0.0379
744.8	952.0	1.442	0.0389
745.8	1438.0	1.386	0.0310
746.3	2783.0	1.434	0.0227
746.5	1037.0	1.364	0.0363
746.7	857.0	1.344	0.0396
747.0	1350.0	1.377	0.0319
747.5	1299.0	1.299	0.0317
747.8	634.0	1.317	0.0456
748.3	954.0	1.369	0.0379
748.3	3867.0	1.385	0.0189
750.0	990.0	1.386	0.0374
751.0	1621.0	1.323	0.0286
751.1	1056.0	1.486	0.0375
751.2	982.0	1.372	0.0374
751.3	2659.0	1.283	0.0220
751.4	400.0	1.335	0.0578
751.6	2851.0	1.331	0.0216
751.6	3863.0	1.347	0.0187
751.7	900.0	1.347	0.0387
751.8	994.0	1.435	0.0380
752.1	1419.0	1.399	0.0314
752.4	640.0	1.350	0.0459
752.8	983.0	1.354	0.0371
753.2	3036.0	1.446	0.0218
753.2	827.0	1.395	0.0411
754.2	1556.0	1.430	0.0303
754.4	2395.0	1.381	0.0240
754.5	931.0	1.302	0.0374
754.7	1220.0	1.333	0.0331
754.7	922.0	1.358	0.0384
754.7	3832.0	1.359	0.0188
754.8	1471.0	1.346	0.0300
755.0	1455.0	1.378	0.0308
755.5	955.0	1.284	0.0367
755.7	5328.0	1.359	0.0160
755.8	2290.0	1.326	0.0240
755.9	959.0	1.432	0.0386
756.0	1562.0	1.341	0.0293
756.9	3892.0	1.402	0.0190
757.4	2450.0	1.294	0.0230
758.3	944.0	1.305	0.0372
759.2	962.0	1.398	0.0381
759.5	3916.0	1.318	0.0183
759.6	975.0	1.374	0.0375
759.8	2566.0	1.265	0.0222
762.2	973.0	1.334	0.0370

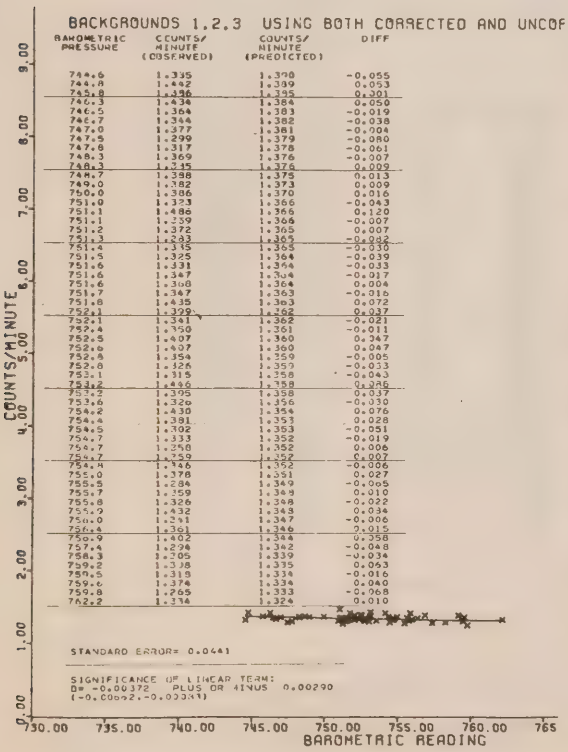
A= 4.162 B= -0.00372



BAROMETRIC PRESSURE	COUNTS/ MINUTE (OBSERVED)	COUNTS/ MINUTE (PREDICTED)	DIFF
744.6	1.335	1.391	-0.056
744.8	1.442	1.390	0.052
745.8	1.386	1.386	-0.000
746.3	1.434	1.384	0.050
746.5	1.364	1.384	-0.020
746.7	1.344	1.383	-0.039
747.0	1.377	1.382	-0.005
747.5	1.299	1.380	-0.081
747.8	1.317	1.379	-0.062
748.3	1.369	1.377	-0.008
748.3	1.385	1.377	0.008
750.0	1.386	1.371	0.015
751.0	1.323	1.367	-0.044
751.1	1.486	1.367	0.119
751.2	1.372	1.366	0.006
751.3	1.283	1.366	-0.083
751.4	1.335	1.365	-0.030
751.6	1.331	1.365	-0.034
751.6	1.347	1.365	-0.018
751.7	1.347	1.364	-0.017
751.8	1.435	1.364	0.071
752.1	1.399	1.363	0.036
752.4	1.350	1.362	-0.012
752.8	1.354	1.360	-0.006
753.2	1.446	1.359	0.087
753.2	1.395	1.359	0.036
754.2	1.430	1.355	0.075
754.4	1.381	1.354	0.027
754.5	1.302	1.354	-0.052
754.7	1.333	1.353	-0.020
754.7	1.358	1.353	0.005
754.7	1.359	1.353	0.006
754.8	1.346	1.353	-0.007
755.0	1.378	1.352	0.026
755.5	1.284	1.350	-0.066
755.7	1.359	1.349	0.010
755.8	1.326	1.349	-0.023
755.9	1.432	1.349	0.083
756.0	1.341	1.348	-0.007
756.9	1.402	1.345	0.057
757.4	1.294	1.343	-0.049
758.3	1.305	1.340	-0.035
759.2	1.398	1.336	0.062
759.5	1.318	1.335	-0.017
759.6	1.374	1.335	0.039
759.8	1.265	1.334	-0.069
762.2	1.334	1.325	0.009

STANDARD ERROR= 0.0470

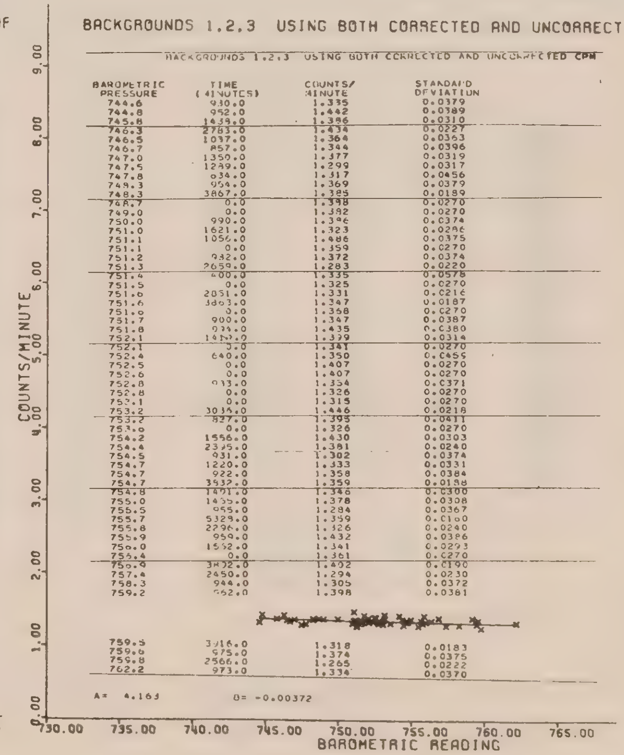
SIGNIFICANCE OF LINEAR TERM:
B= -0.00372 PLUS OR MINUS 0.00320
(-0.00693,-0.00052)



BAROMETRIC PRESSURE	COUNTS/ MINUTE (OBSERVED)	COUNTS/ MINUTE (PREDICTED)	DIFF
744.6	1.335	1.390	-0.055
744.8	1.442	1.389	0.053
745.8	1.396	1.395	0.001
746.3	1.434	1.384	0.050
746.5	1.364	1.383	-0.019
746.7	1.344	1.382	-0.038
747.0	1.377	1.381	-0.004
747.5	1.299	1.379	-0.080
747.8	1.317	1.378	-0.061
748.3	1.369	1.376	-0.007
748.3	1.385	1.376	0.009
748.7	1.388	1.375	0.013
749.0	1.382	1.373	0.009
750.0	1.386	1.370	0.016
751.0	1.323	1.366	-0.043
751.1	1.486	1.366	0.120
751.1	1.359	1.366	-0.007
751.2	1.372	1.365	0.007
751.3	1.283	1.365	-0.082
751.4	1.335	1.365	-0.030
751.5	1.325	1.364	-0.039
751.6	1.331	1.364	-0.033
751.6	1.347	1.364	-0.017
751.6	1.368	1.364	0.004
751.7	1.347	1.363	-0.016
751.8	1.435	1.363	0.072
752.1	1.399	1.362	0.037
752.1	1.341	1.362	-0.021
752.4	1.350	1.361	-0.011
752.5	1.407	1.360	0.047
752.6	1.407	1.360	0.047
752.8	1.354	1.359	-0.005
752.8	1.326	1.359	-0.033
753.1	1.315	1.358	-0.043
753.2	1.446	1.358	0.088
753.2	1.395	1.358	0.037
753.6	1.326	1.356	-0.030
754.2	1.430	1.354	0.076
754.4	1.381	1.353	0.028
754.5	1.302	1.353	-0.051
754.7	1.333	1.352	-0.019
754.7	1.358	1.352	0.006
754.7	1.359	1.352	0.007
754.8	1.346	1.352	-0.006
755.0	1.378	1.351	0.027
755.5	1.284	1.349	-0.065
755.7	1.359	1.349	0.010
755.8	1.326	1.348	-0.022
755.9	1.432	1.348	0.084
756.0	1.341	1.347	-0.006
756.4	1.361	1.346	0.015
756.9	1.402	1.344	0.058
757.4	1.294	1.342	-0.048
758.3	1.305	1.339	-0.034
759.2	1.398	1.335	0.063
759.5	1.318	1.334	-0.016
759.6	1.374	1.334	0.040
759.8	1.265	1.333	-0.068
762.2	1.334	1.324	0.010

STANDARD ERROR= 0.0441

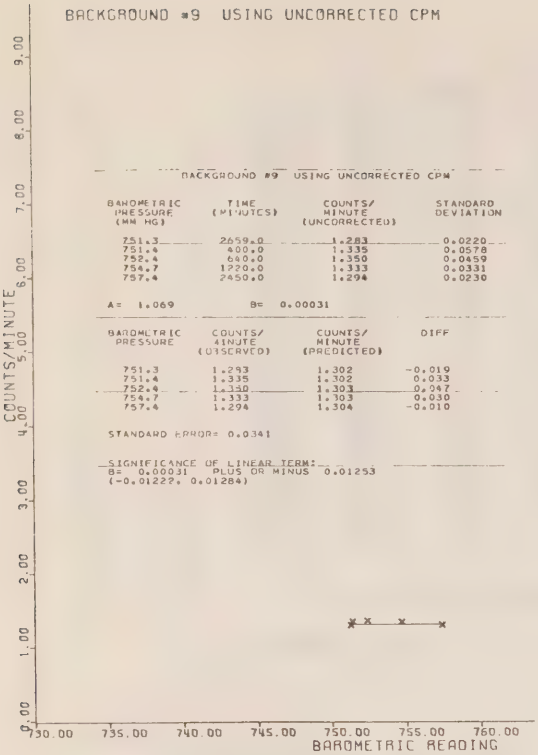
SIGNIFICANCE OF LINEAR TERM:
B= -0.00372 PLUS OR MINUS 0.00290
(-0.00662,-0.00081)



BACKGROUNDS 1.2.3 USING BOTH CORRECTED AND UNCORRECTED CPM

BAROMETRIC PRESSURE	TIME (MINUTES)	COUNTS/ MINUTE	STANDARD DEVIATION
744.6	930.0	1.335	0.0379
744.8	952.0	1.442	0.0389
745.8	1439.0	1.396	0.0310
746.3	2783.0	1.434	0.0227
746.5	1037.0	1.364	0.0363
746.7	857.0	1.344	0.0396
747.0	1350.0	1.377	0.0319
747.5	1299.0	1.299	0.0317
747.8	634.0	1.317	0.0456
748.3	954.0	1.369	0.0379
748.3	3867.0	1.385	0.0189
748.7	0.0	1.398	0.0270
749.0	0.0	1.392	0.0270
750.0	990.0	1.396	0.0374
751.0	1621.0	1.323	0.0286
751.1	1056.0	1.486	0.0375
751.1	0.0	1.359	0.0270
751.2	932.0	1.372	0.0374
751.3	2659.0	1.283	0.0220
751.4	400.0	1.335	0.0578
751.5	0.0	1.325	0.0270
751.6	2851.0	1.331	0.0216
751.6	3863.0	1.347	0.0187
751.6	0.0	1.368	0.0270
751.7	900.0	1.347	0.0387
751.8	994.0	1.435	0.0380
752.1	1419.0	1.399	0.0314
752.1	0.0	1.341	0.0270
752.4	640.0	1.350	0.0455
752.5	0.0	1.407	0.0270
752.6	0.0	1.407	0.0270
752.8	983.0	1.354	0.0371
752.8	0.0	1.326	0.0270
753.1	0.0	1.315	0.0270
753.2	3036.0	1.446	0.0218
753.2	827.0	1.395	0.0411
753.6	0.0	1.326	0.0270
754.2	1556.0	1.430	0.0303
754.4	2395.0	1.381	0.0240
754.5	931.0	1.302	0.0374
754.7	1220.0	1.333	0.0331
754.7	922.0	1.358	0.0384
754.7	3832.0	1.359	0.0188
754.8	1471.0	1.346	0.0300
755.0	1455.0	1.378	0.0308
755.5	955.0	1.284	0.0367
755.7	5329.0	1.359	0.0160
755.8	2296.0	1.326	0.0240
755.9	959.0	1.432	0.0386
756.0	1562.0	1.341	0.0293
756.4	0.0	1.361	0.0270
756.9	3892.0	1.402	0.0190
757.4	2450.0	1.294	0.0230
758.3	944.0	1.305	0.0372
759.2	962.0	1.398	0.0381
759.5	3916.0	1.318	0.0183
759.6	975.0	1.374	0.0375
759.8	2566.0	1.265	0.0222
762.2	973.0	1.334	0.0370

A= 4.163 B= -0.00372



BACKGROUND #9 USING UNCORRECTED CPM

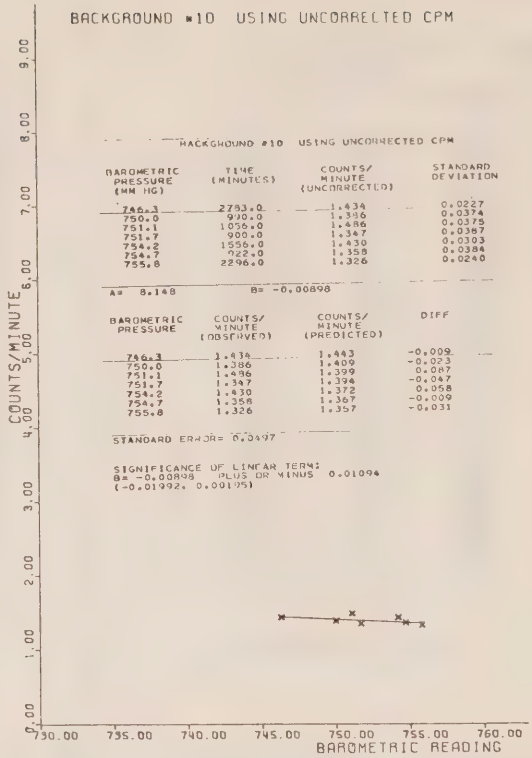
BAROMETRIC PRESSURE (MM HG)	TIME (MINUTES)	COUNTS/ MINUTE (UNCORRECTED)	STANDARD DEVIATION
751.3	2659.0	1.283	0.0220
751.4	400.0	1.335	0.0578
752.4	640.0	1.350	0.0459
754.7	1220.0	1.333	0.0331
757.4	2450.0	1.294	0.0230

A= 1.069 B= 0.00031

BAROMETRIC PRESSURE	COUNTS/ MINUTE (OBSERVED)	COUNTS/ MINUTE (PREDICTED)	DIFF
751.3	1.293	1.302	-0.019
751.4	1.335	1.302	0.033
752.4	1.350	1.303	0.047
754.7	1.333	1.303	0.030
757.4	1.294	1.304	-0.010

STANDARD ERROR= 0.0341

SIGNIFICANCE OF LINEAR TERM:
B= 0.00031 PLUS OR MINUS 0.01253
(-0.01222, 0.01284)



BACKGROUND #10 USING UNCORRECTED CPM

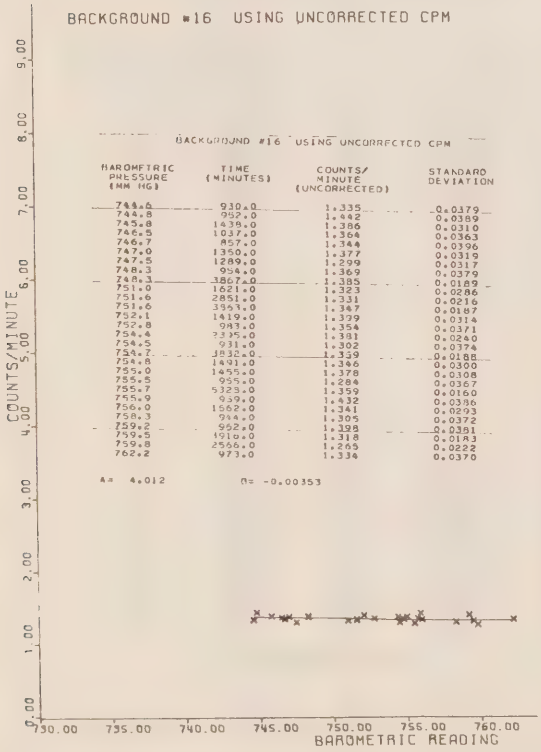
BAROMETRIC PRESSURE (MM HG)	TIME (MINUTES)	COUNTS/ MINUTE (UNCORRECTED)	STANDARD DEVIATION
746.3	2783.0	1.434	0.0227
750.0	990.0	1.386	0.0374
751.1	1056.0	1.486	0.0375
751.7	900.0	1.347	0.0387
754.2	1556.0	1.430	0.0303
754.7	922.0	1.358	0.0384
755.8	2296.0	1.326	0.0240

A= 8.148 B= -0.00898

BAROMETRIC PRESSURE	COUNTS/ MINUTE (OBSERVED)	COUNTS/ MINUTE (PREDICTED)	DIFF
746.3	1.434	1.443	-0.009
750.0	1.386	1.409	-0.023
751.1	1.486	1.399	0.087
751.7	1.347	1.394	-0.047
754.2	1.430	1.372	0.058
754.7	1.358	1.367	-0.009
755.8	1.326	1.357	-0.031

STANDARD ERROR= 0.0497

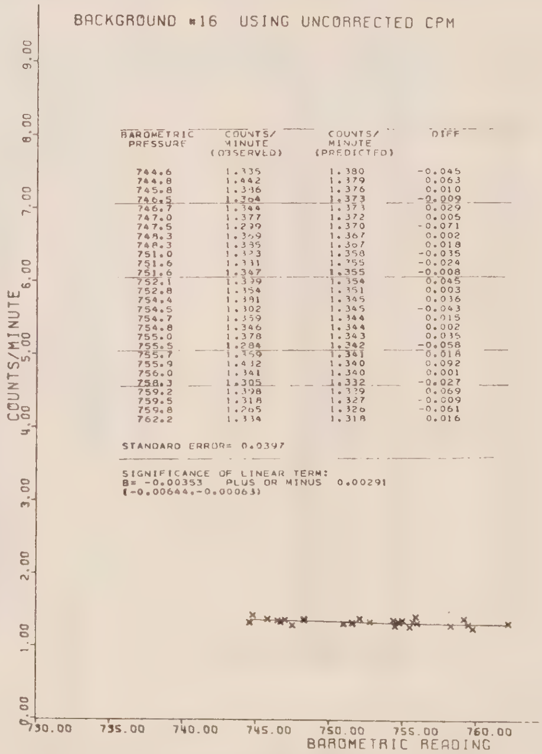
SIGNIFICANCE OF LINEAR TERM:
B= -0.00898 PLUS OR MINUS 0.01094
(-0.01992, 0.00195)



BACKGROUND #16 USING UNCORRECTED CPM

BAROMETRIC PRESSURE (MM HG)	TIME (MINUTES)	COUNTS/ MINUTE (UNCORRECTED)	STANDARD DEVIATION
744.6	930.0	1.335	0.0379
744.8	952.0	1.442	0.0389
745.8	1438.0	1.386	0.0310
746.5	1037.0	1.364	0.0363
746.7	857.0	1.344	0.0396
747.0	1350.0	1.377	0.0319
747.5	1289.0	1.299	0.0317
748.3	954.0	1.369	0.0379
748.3	3867.0	1.385	0.0189
751.0	1621.0	1.323	0.0286
751.6	2851.0	1.331	0.0216
751.6	3963.0	1.347	0.0187
752.1	1419.0	1.399	0.0314
752.8	983.0	1.354	0.0371
754.4	2335.0	1.381	0.0240
754.5	931.0	1.302	0.0374
754.7	3832.0	1.359	0.0188
754.8	1491.0	1.346	0.0300
755.0	1455.0	1.378	0.0308
755.5	955.0	1.284	0.0367
755.7	5329.0	1.359	0.0160
755.9	939.0	1.432	0.0386
756.0	1562.0	1.341	0.0293
758.3	944.0	1.305	0.0372
759.2	952.0	1.398	0.0381
759.5	3910.0	1.318	0.0183
759.8	2566.0	1.265	0.0222
762.2	973.0	1.334	0.0370

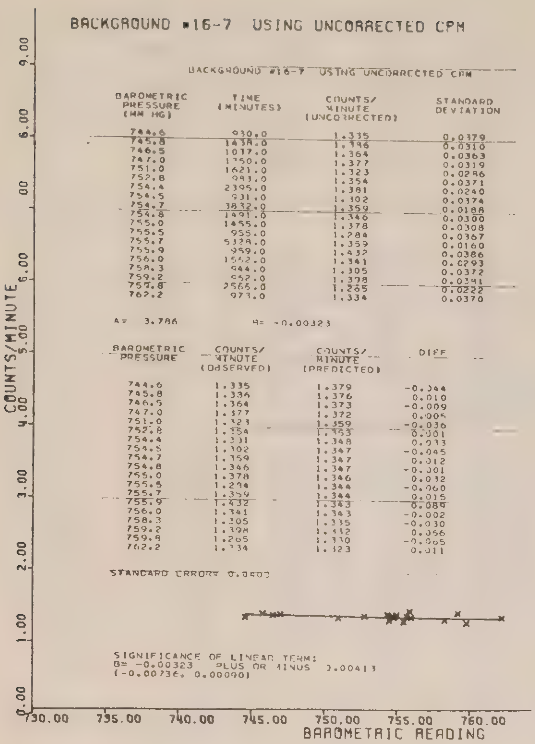
A= 4.012 B= -0.00353



BAROMETRIC PRESSURE	COUNTS/ MINUTE (OBSERVED)	COUNTS/ MINUTE (PREDICTED)	DIFF
744.6	1.335	1.380	-0.045
744.8	1.442	1.379	0.063
745.8	1.386	1.376	0.010
746.5	1.364	1.373	-0.009
746.7	1.344	1.373	0.029
747.0	1.377	1.372	0.005
747.5	1.299	1.370	-0.071
748.3	1.369	1.367	0.002
748.3	1.385	1.367	0.018
751.0	1.323	1.358	-0.035
751.6	1.331	1.355	-0.024
751.6	1.347	1.355	-0.008
752.1	1.399	1.354	0.045
752.8	1.354	1.351	0.003
754.4	1.381	1.345	0.036
754.5	1.302	1.345	-0.043
754.7	1.359	1.344	0.015
754.8	1.346	1.344	0.002
755.0	1.378	1.343	0.035
755.5	1.284	1.342	-0.058
755.7	1.359	1.341	0.018
755.9	1.432	1.340	0.092
756.0	1.341	1.340	0.001
758.3	1.305	1.332	-0.027
759.2	1.398	1.329	0.069
759.5	1.318	1.327	-0.009
759.8	1.265	1.326	-0.061
762.2	1.334	1.318	0.016

STANDARD ERROR= 0.0397

SIGNIFICANCE OF LINEAR TERM:
B= -0.00353 PLUS OR MINUS 0.00291
(-0.00644,-0.00063)



BACKGROUND #16-7 USING UNCORRECTED CPM

BACKGROUND #16-7 USING UNCORRECTED CPM

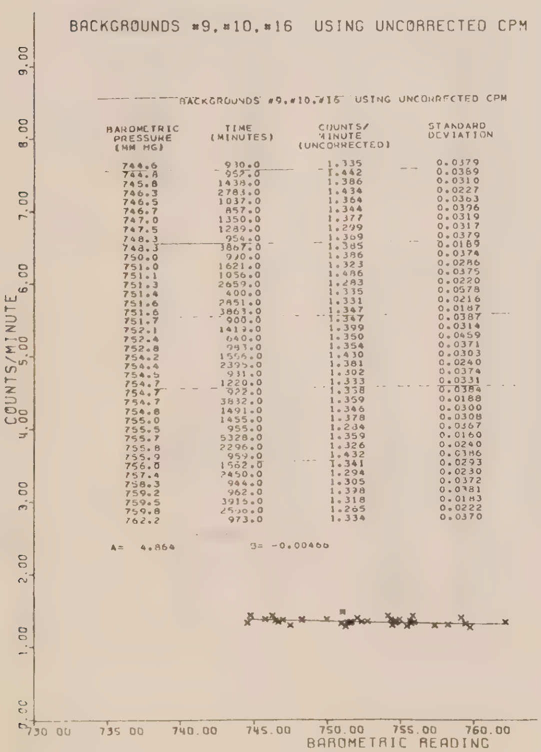
BAROMETRIC PRESSURE (MM HG)	TIME (MINUTES)	COUNTS/MINUTE (UNCORRECTED)	STANDARD DEVIATION
744.6	930.0	1.335	0.0379
745.8	1438.0	1.386	0.0310
746.5	1037.0	1.364	0.0363
747.0	1350.0	1.377	0.0319
751.0	1621.0	1.323	0.0286
752.8	993.0	1.354	0.0371
754.4	2395.0	1.381	0.0240
754.5	931.0	1.302	0.0374
754.7	3832.0	1.359	0.0188
754.8	1491.0	1.346	0.0300
755.0	1455.0	1.378	0.0308
755.5	955.0	1.284	0.0367
755.7	5328.0	1.359	0.0160
755.9	959.0	1.432	0.0386
756.0	1562.0	1.341	0.0293
758.3	944.0	1.305	0.0372
759.2	962.0	1.398	0.0341
759.8	2565.0	1.265	0.0222
762.2	973.0	1.334	0.0370

A= 3.786 B= -0.00323

BAROMETRIC PRESSURE	COUNTS/MINUTE (OBSERVED)	COUNTS/MINUTE (PREDICTED)	DIFF
744.6	1.335	1.379	-0.044
745.8	1.386	1.376	0.010
746.5	1.364	1.373	-0.009
747.0	1.377	1.372	0.005
751.0	1.323	1.359	-0.036
752.8	1.354	1.353	0.001
754.4	1.381	1.348	0.033
754.5	1.302	1.347	-0.045
754.7	1.359	1.347	0.012
754.8	1.346	1.347	-0.001
755.0	1.378	1.346	0.032
755.5	1.284	1.344	-0.060
755.7	1.359	1.344	0.015
755.9	1.432	1.343	0.089
756.0	1.341	1.343	-0.002
758.3	1.305	1.335	-0.030
759.2	1.398	1.332	0.066
759.9	1.265	1.330	-0.065
762.2	1.334	1.323	0.011

STANDARD ERROR= 0.0403

SIGNIFICANCE OF LINEAR TERM:
B= -0.00323 PLUS OR MINUS 0.00413
(-0.00736, 0.00090)

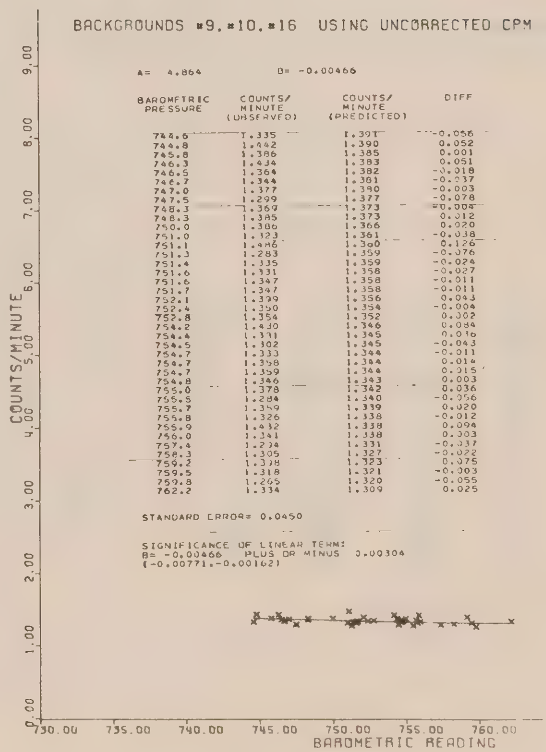


BACKGROUNDS #9, #10, #16 USING UNCORRECTED CPM

BACKGROUNDS #9, #10, #16 USING UNCORRECTED CPM

BAROMETRIC PRESSURE (MM HG)	TIME (MINUTES)	COUNTS/MINUTE (UNCORRECTED)	STANDARD DEVIATION
744.6	930.0	1.335	0.0379
744.8	952.0	1.442	0.0389
745.8	1438.0	1.386	0.0310
746.3	2783.0	1.434	0.0227
746.5	1037.0	1.364	0.0363
746.7	857.0	1.344	0.0396
747.0	1350.0	1.377	0.0319
747.5	1289.0	1.299	0.0317
748.3	954.0	1.369	0.0379
748.3	3867.0	1.385	0.0189
750.0	970.0	1.386	0.0374
751.0	1621.0	1.323	0.0286
751.1	1056.0	1.486	0.0375
751.3	2659.0	1.283	0.0220
751.4	400.0	1.335	0.0578
751.6	2851.0	1.331	0.0216
751.6	3863.0	1.347	0.0187
751.7	900.0	1.347	0.0387
752.1	1419.0	1.399	0.0314
752.4	640.0	1.350	0.0459
752.8	983.0	1.354	0.0371
754.2	1556.0	1.430	0.0303
754.4	2395.0	1.381	0.0240
754.5	931.0	1.302	0.0374
754.7	1220.0	1.333	0.0331
754.7	922.0	1.358	0.0384
754.7	3832.0	1.359	0.0188
754.8	1491.0	1.346	0.0300
755.0	1455.0	1.378	0.0308
755.5	955.0	1.284	0.0367
755.7	5328.0	1.359	0.0160
755.8	2296.0	1.326	0.0240
755.9	959.0	1.432	0.0386
756.0	1562.0	1.341	0.0293
757.4	2450.0	1.294	0.0230
758.3	944.0	1.305	0.0372
759.2	962.0	1.398	0.0381
759.5	3915.0	1.318	0.0183
759.8	2530.0	1.265	0.0222
762.2	973.0	1.334	0.0370

A= 4.864 B= -0.00466



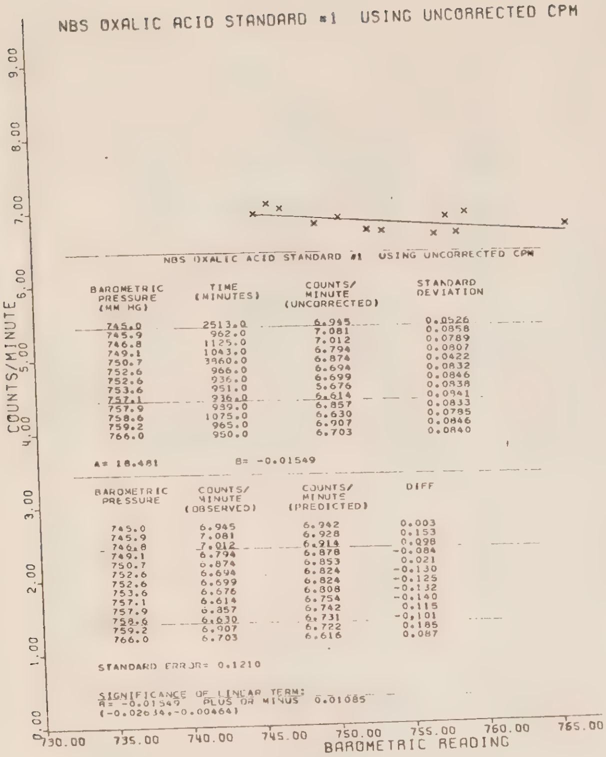
BACKGROUNDS #9, #10, #16 USING UNCORRECTED CPM

A= 4.864 B= -0.00466

BAROMETRIC PRESSURE	COUNTS/MINUTE (OBSERVED)	COUNTS/MINUTE (PREDICTED)	DIFF
744.6	1.335	1.391	-0.056
744.8	1.442	1.390	0.052
745.8	1.386	1.385	0.001
746.3	1.434	1.383	0.051
746.5	1.364	1.382	-0.018
746.7	1.344	1.381	-0.037
747.0	1.377	1.380	-0.003
747.5	1.299	1.377	-0.078
748.3	1.369	1.373	-0.004
748.3	1.385	1.373	0.012
750.0	1.386	1.366	0.020
751.0	1.323	1.361	-0.038
751.1	1.486	1.360	0.126
751.3	1.283	1.359	-0.076
751.4	1.335	1.359	-0.024
751.6	1.331	1.358	-0.027
751.6	1.347	1.358	-0.011
751.7	1.347	1.358	-0.011
752.1	1.399	1.356	0.043
752.4	1.350	1.354	-0.004
752.8	1.354	1.352	0.002
754.2	1.430	1.346	0.084
754.4	1.381	1.345	0.036
754.5	1.302	1.345	-0.043
754.7	1.333	1.344	-0.011
754.7	1.358	1.344	0.014
754.7	1.359	1.344	0.015
754.8	1.346	1.343	0.003
755.0	1.378	1.342	0.036
755.5	1.284	1.340	-0.056
755.7	1.359	1.339	0.020
755.8	1.326	1.338	-0.012
755.9	1.432	1.338	0.094
756.0	1.341	1.338	0.003
757.4	1.294	1.331	-0.037
758.3	1.305	1.327	-0.022
759.2	1.398	1.323	0.075
759.5	1.318	1.321	-0.003
759.8	1.265	1.320	-0.055
762.2	1.334	1.309	0.025

STANDARD ERROR= 0.0450

SIGNIFICANCE OF LINEAR TERM:
B= -0.00466 PLUS OR MINUS 0.00304
(-0.00771, -0.00162)



NBS OXALIC ACID STANDARD #1 USING UNCORRECTED CPM

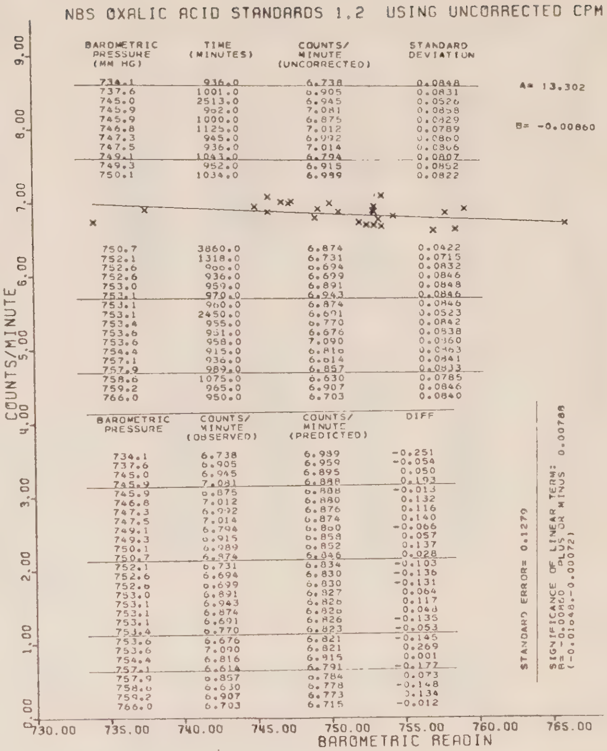
BAROMETRIC PRESSURE (MM HG)	TIME (MINUTES)	COUNTS/ MINUTE (UNCORRECTED)	STANDARD DEVIATION
745.0	2513.0	6.945	0.0526
745.9	962.0	7.081	0.0858
746.8	1125.0	7.012	0.0789
749.1	1043.0	6.794	0.0807
750.7	3960.0	6.874	0.0422
752.6	966.0	6.694	0.0832
752.6	936.0	6.699	0.0846
753.6	951.0	5.676	0.0838
757.1	936.0	6.614	0.0941
757.9	939.0	6.857	0.0833
758.6	1075.0	6.630	0.0785
759.2	965.0	6.907	0.0846
766.0	950.0	6.703	0.0840

A= 18.481 B= -0.01549

BAROMETRIC PRESSURE	COUNTS/ MINUTE (OBSERVED)	COUNTS/ MINUTE (PREDICTED)	DIFF
745.0	6.945	6.942	0.003
745.9	7.081	6.928	0.153
746.8	7.012	6.914	0.098
749.1	6.794	6.878	-0.084
750.7	6.874	6.853	0.021
752.6	6.694	6.824	-0.130
752.6	6.699	6.824	-0.125
753.6	6.676	6.808	-0.132
757.1	6.614	6.754	-0.140
757.9	6.857	6.742	0.115
758.6	6.630	6.731	-0.101
759.2	6.907	6.722	0.185
766.0	6.703	6.616	0.087

STANDARD ERROR= 0.1210

SIGNIFICANCE OF LINEAR TERM:
B= -0.01549 PLUS OR MINUS 0.01085
(-0.02634,-0.00464)



BAROMETRIC PRESSURE (MM HG)	TIME (MINUTES)	COUNTS/ MINUTE (UNCORRECTED)	STANDARD DEVIATION
734.1	936.0	6.738	0.0848
737.6	1001.0	6.905	0.0831
745.0	2513.0	6.945	0.0526
745.9	962.0	7.081	0.0858
745.9	1000.0	6.875	0.0829
746.8	1125.0	7.012	0.0789
747.3	945.0	6.992	0.0860
747.5	936.0	7.014	0.0866
749.1	1043.0	6.794	0.0807
749.3	952.0	6.915	0.0852
750.1	1034.0	6.999	0.0822
750.7	3860.0	6.874	0.0422
752.1	1318.0	6.731	0.0715
752.6	900.0	6.694	0.0832
752.6	936.0	6.699	0.0846
753.0	959.0	6.891	0.0848
753.1	970.0	6.943	0.0846
753.1	960.0	6.874	0.0846
753.1	2450.0	6.691	0.0523
753.4	955.0	6.770	0.0842
753.6	951.0	6.676	0.0838
753.6	958.0	7.090	0.0860
754.4	915.0	6.810	0.0863
757.1	936.0	6.614	0.0841
757.9	989.0	6.857	0.0833
758.6	1075.0	6.630	0.0785
759.2	965.0	6.907	0.0846
766.0	950.0	6.703	0.0840

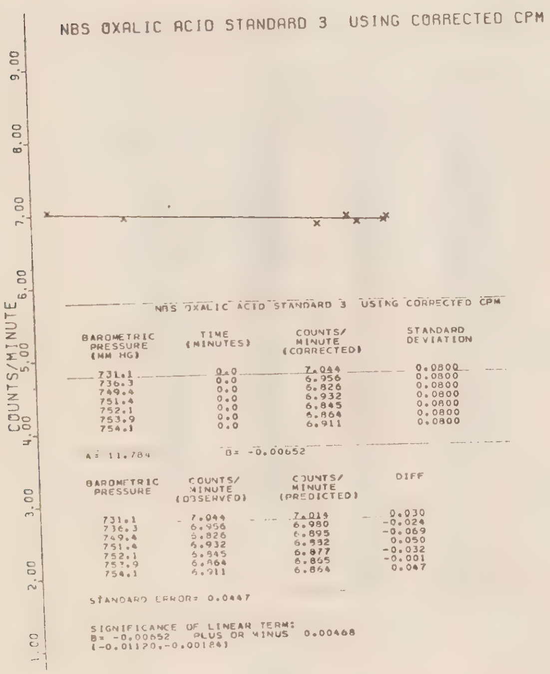
A= 13.302

B= -0.00860

BAROMETRIC PRESSURE	COUNTS/ MINUTE (OBSERVED)	COUNTS/ MINUTE (PREDICTED)	DIFF
734.1	6.738	6.989	-0.251
737.6	6.905	6.959	-0.054
745.0	6.945	6.895	0.050
745.9	7.081	6.888	0.193
745.9	6.875	6.888	-0.013
746.8	7.012	6.880	0.132
747.3	6.992	6.876	0.116
747.5	7.014	6.874	0.140
749.1	6.794	6.860	-0.066
749.3	6.915	6.858	0.057
750.1	6.989	6.852	0.137
750.7	6.874	6.846	0.028
752.1	6.731	6.834	-0.103
752.6	6.694	6.830	-0.136
752.6	6.699	6.830	-0.131
753.0	6.891	6.827	0.064
753.1	6.943	6.826	0.117
753.1	6.874	6.826	0.048
753.1	6.691	6.826	-0.135
753.4	6.770	6.823	-0.053
753.6	6.676	6.821	-0.145
753.6	7.090	6.821	0.269
754.4	6.816	6.815	0.001
757.1	6.614	6.791	-0.177
757.9	6.857	6.784	0.073
758.6	6.630	6.778	-0.148
759.2	6.907	6.773	0.134
766.0	6.703	6.715	-0.012

STANDARD ERROR= 0.1279

SIGNIFICANCE OF LINEAR TERM:
B= -0.00860 PLUS OR MINUS 0.00788
(-0.01648,-0.00072)



NBS OXALIC ACID STANDARD 3 USING CORRECTED CPM

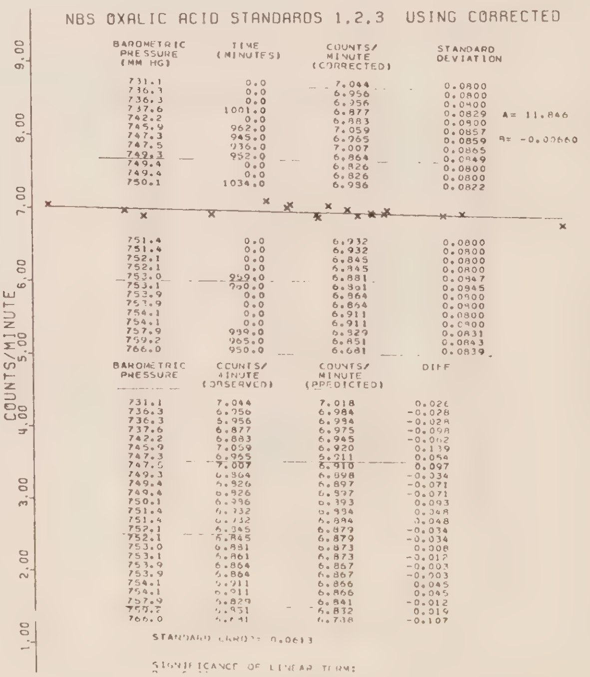
BAROMETRIC PRESSURE (MM HG)	TIME (MINUTES)	COUNTS/ MINUTE (CORRECTED)	STANDARD DEVIATION
731.1	0.0	7.044	0.0800
736.3	0.0	6.956	0.0800
749.4	0.0	6.826	0.0800
751.4	0.0	6.932	0.0800
752.1	0.0	6.845	0.0800
753.9	0.0	6.864	0.0800
754.1	0.0	6.911	0.0800

A= 11.784 B= -0.00652

BAROMETRIC PRESSURE	COUNTS/ MINUTE (OBSERVED)	COUNTS/ MINUTE (PREDICTED)	DIFF
731.1	7.044	7.014	0.030
736.3	6.956	6.980	-0.024
749.4	6.826	6.895	-0.069
751.4	6.932	6.882	0.050
752.1	6.845	6.877	-0.032
753.9	6.864	6.865	-0.001
754.1	6.911	6.864	0.047

STANDARD ERROR= 0.0447

SIGNIFICANCE OF LINEAR TERM:
B= -0.00652 PLUS OR MINUS 0.00468
(-0.01120,-0.00184)



BAROMETRIC PRESSURE (MM HG)	TIME (MINUTES)	COUNTS/ MINUTE (CORRECTED)	STANDARD DEVIATION
731.1	0.0	7.044	0.0800
736.3	0.0	6.956	0.0800
736.3	0.0	6.956	0.0400
737.6	1001.0	6.877	0.0829
742.2	0.0	6.883	0.0900
745.9	962.0	7.059	0.0857
747.3	945.0	6.965	0.0859
747.5	936.0	7.007	0.0865
749.3	952.0	6.864	0.0849
749.4	0.0	6.826	0.0800
749.4	0.0	6.826	0.0800
750.1	1034.0	6.996	0.0822
751.4	0.0	6.932	0.0800
751.4	0.0	6.932	0.0800
752.1	0.0	6.845	0.0800
752.1	0.0	6.845	0.0800
753.0	959.0	6.881	0.0947
753.1	960.0	6.801	0.0945
753.9	0.0	6.864	0.0900
753.9	0.0	6.864	0.0900
754.1	0.0	6.911	0.0800
754.1	0.0	6.911	0.0900
757.9	939.0	6.929	0.0831
759.2	965.0	6.851	0.0843
766.0	950.0	6.681	0.0839

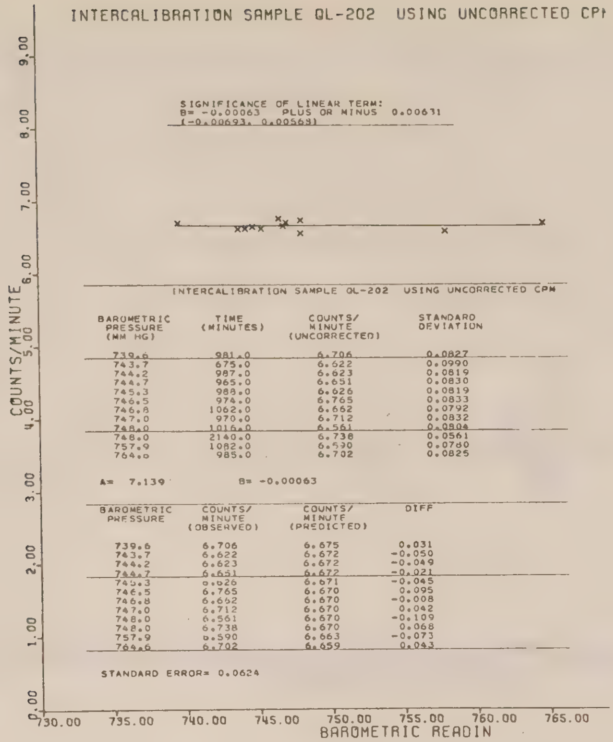
A= 11.846

B= -0.00660

BAROMETRIC PRESSURE	COUNTS/ MINUTE (OBSERVED)	COUNTS/ MINUTE (PREDICTED)	DIFF
731.1	7.044	7.018	0.026
736.3	6.956	6.984	-0.028
736.3	5.956	6.994	-0.028
737.6	6.877	6.975	-0.098
742.2	6.883	6.945	-0.062
745.9	7.059	6.920	0.139
747.3	6.965	6.911	0.054
747.5	7.007	6.910	0.097
749.3	6.864	6.898	-0.034
749.4	6.926	6.897	-0.071
749.4	6.926	6.997	-0.071
750.1	6.996	6.393	0.093
751.4	6.932	6.994	0.048
751.4	6.932	6.884	0.048
752.1	6.845	6.879	-0.034
752.1	6.845	6.879	-0.034
753.0	6.881	6.873	0.008
753.1	6.861	6.873	-0.012
753.9	6.864	6.867	-0.003
753.9	6.864	6.867	-0.003
754.1	6.911	6.866	0.045
754.1	6.911	6.866	0.045
757.9	6.829	6.841	-0.012
759.2	6.851	6.832	0.019
766.0	6.631	6.738	-0.107

STANDARD ERROR= 0.0613

SIGNIFICANCE OF LINEAR TERM:



SIGNIFICANCE OF LINEAR TERM:
B= -0.00063 PLUS OR MINUS 0.00631
(-0.00693, 0.00568)

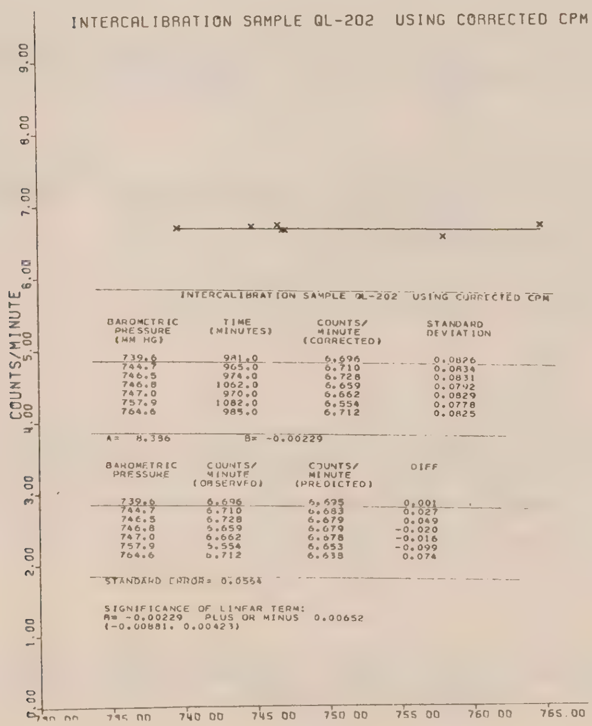
INTERCALIBRATION SAMPLE QL-202 USING UNCORRECTED CPM

BAROMETRIC PRESSURE (MM HG)	TIME (MINUTES)	COUNTS/ MINUTE (UNCORRECTED)	STANDARD DEVIATION
739.6	981.0	6.706	0.0827
743.7	675.0	6.622	0.0990
744.2	987.0	6.623	0.0819
744.7	965.0	6.651	0.0830
745.3	988.0	6.626	0.0819
746.5	974.0	6.765	0.0833
746.8	1062.0	6.662	0.0792
747.0	970.0	6.712	0.0832
748.0	1016.0	6.561	0.0804
748.0	2140.0	6.738	0.0561
757.9	1082.0	6.590	0.0760
764.6	985.0	6.702	0.0825

A= 7.139 B= -0.00063

BAROMETRIC PRESSURE	COUNTS/ MINUTE (OBSERVED)	COUNTS/ MINUTE (PREDICTED)	DIFF
739.6	6.706	6.675	0.031
743.7	6.622	6.672	-0.050
744.2	6.623	6.672	-0.049
744.7	6.651	6.672	-0.021
745.3	6.626	6.671	-0.045
746.5	6.765	6.670	0.095
746.8	6.662	6.670	-0.008
747.0	6.712	6.670	0.042
748.0	6.561	6.670	-0.109
748.0	6.738	6.670	0.068
757.9	6.590	6.663	-0.073
764.6	6.702	6.659	0.043

STANDARD ERROR= 0.0624



INTERCALIBRATION SAMPLE QL-202 USING CORRECTED CPM

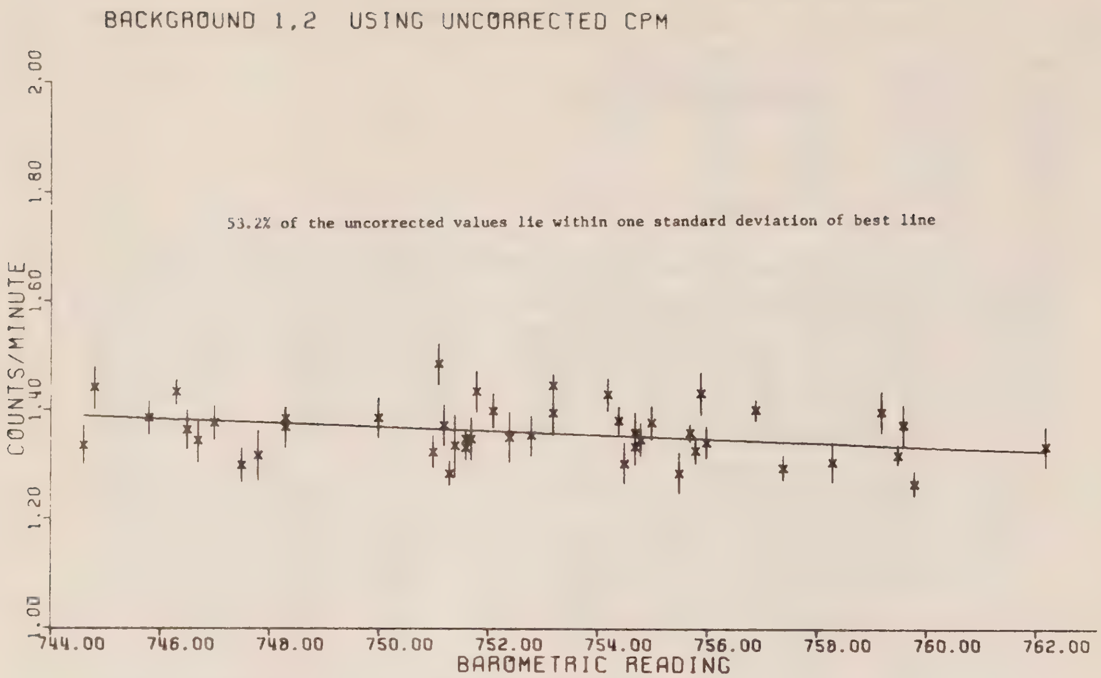
BAROMETRIC PRESSURE (MM HG)	TIME (MINUTES)	COUNTS/ MINUTE (CORRECTED)	STANDARD DEVIATION
739.6	981.0	6.696	0.0826
744.7	965.0	6.710	0.0834
746.5	974.0	6.728	0.0831
746.8	1062.0	6.659	0.0792
747.0	970.0	6.662	0.0829
757.9	1082.0	6.554	0.0778
764.6	985.0	6.712	0.0825

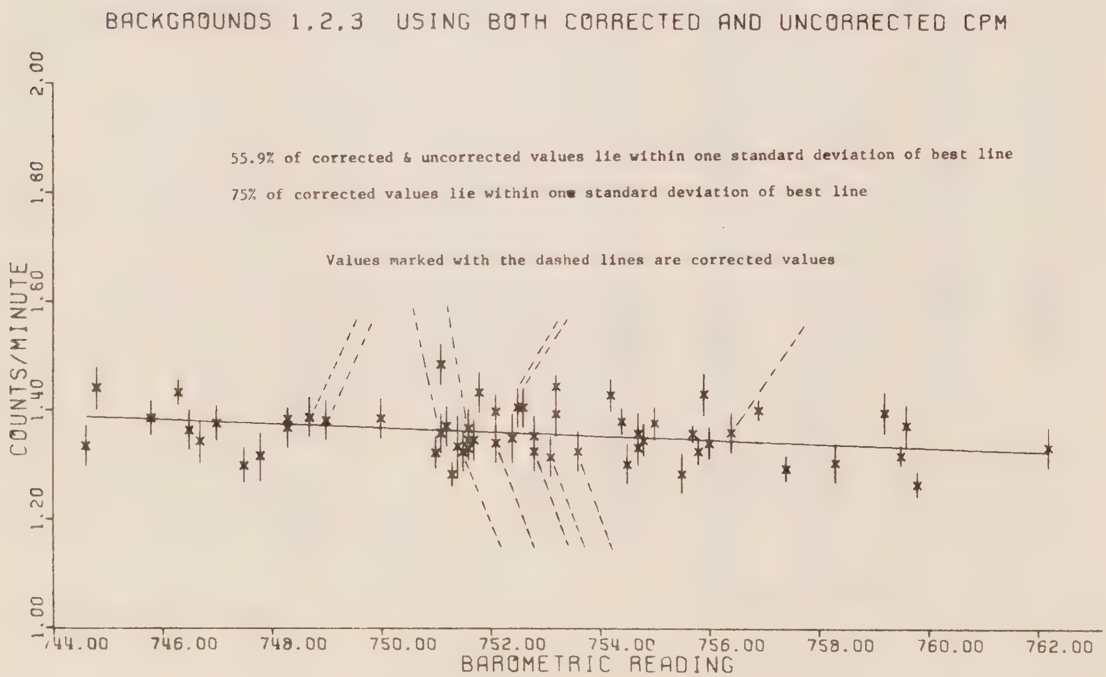
A= 8.396 B= -0.00229

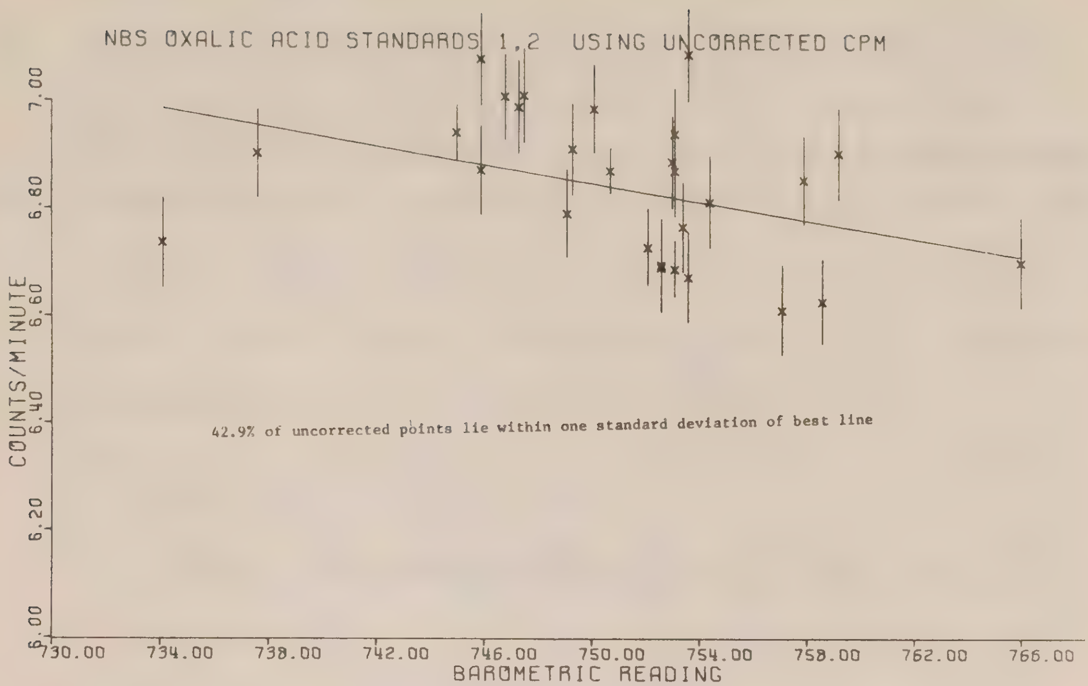
BAROMETRIC PRESSURE	COUNTS/ MINUTE (OBSERVED)	COUNTS/ MINUTE (PREDICTED)	DIFF
739.6	6.696	6.695	0.001
744.7	6.710	6.683	0.027
746.5	6.728	6.679	0.049
746.8	6.659	6.679	-0.020
747.0	6.662	6.678	-0.016
757.9	6.554	6.653	-0.099
764.6	6.712	6.638	0.074

STANDARD ERROR= 0.0554

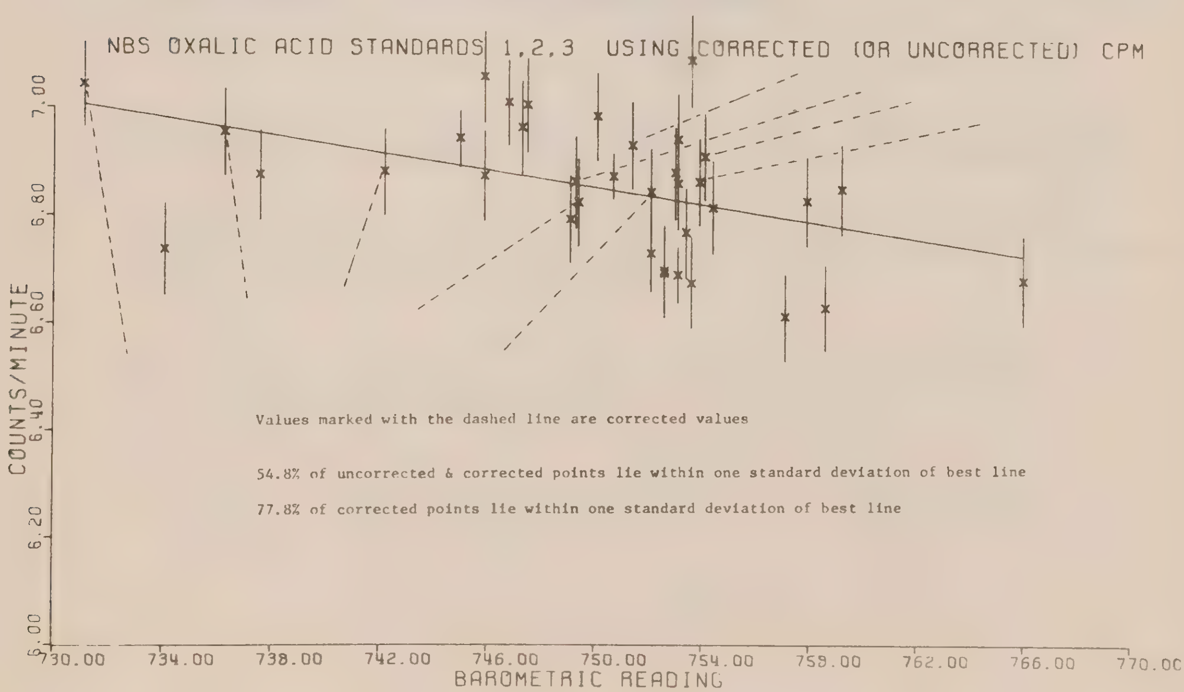
SIGNIFICANCE OF LINEAR TERM:
B= -0.00229 PLUS OR MINUS 0.00652
(-0.00881, 0.00423)


BACKGROUND 1,2 USING UNCORRECTED CPM
53.2% of the uncorrected values lie within one standard deviation of best line
COUNTS/MINUTE
1.00
1.20
1.40
1.60
1.80
2.00
744.00
746.00
748.00
750.00
752.00
754.00
756.00
758.00
760.00
762.00
BAROMETRIC READING


BACKGROUNDS 1,2,3 USING BOTH CORRECTED AND UNCORRECTED CPM
55.9% of corrected & uncorrected values lie within one standard deviation of best line
75% of corrected values lie within one standard deviation of best line
Values marked with the dashed lines are corrected values
COUNTS/MINUTE
1.00
1.20
1.40
1.60
1.80
2.00
744.00
746.00
748.00
750.00
752.00
754.00
756.00
758.00
760.00
762.00
BAROMETRIC READING

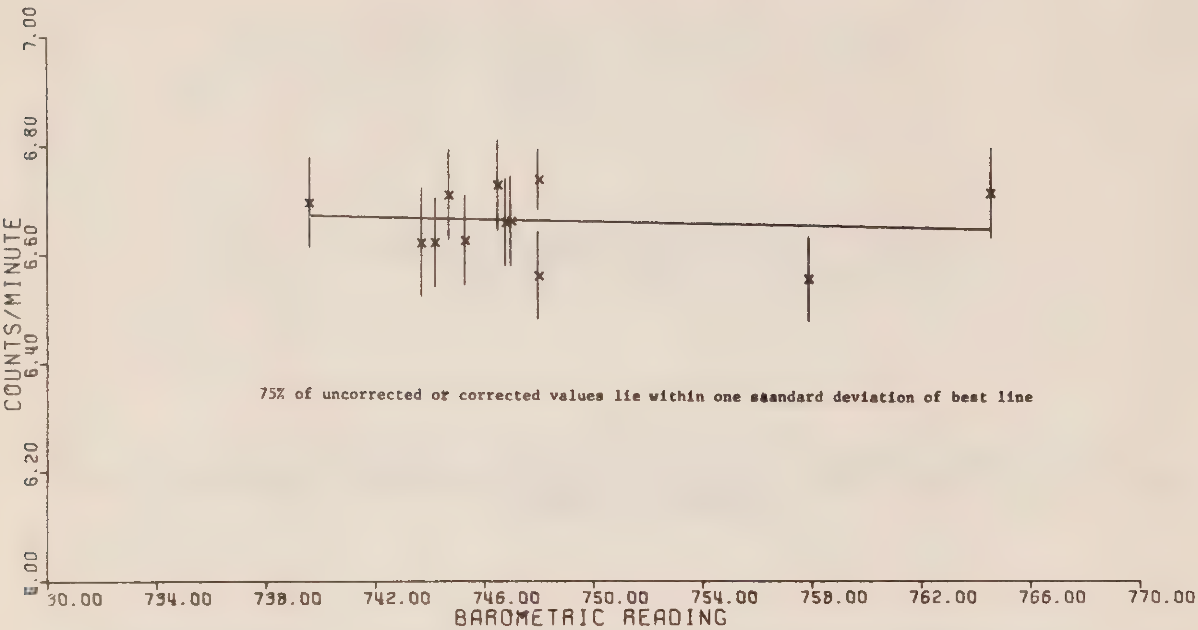


NBS OXALIC ACID STANDARDS 1,2 USING UNCORRECTED CPM
COUNTS/MINUTE
6.00
6.20
6.40
6.60
6.80
7.00
730.00
734.00
738.00
742.00
746.00
750.00
754.00
758.00
762.00
766.00
BAROMETRIC READING
42.9% of uncorrected points lie within one standard deviation of best line

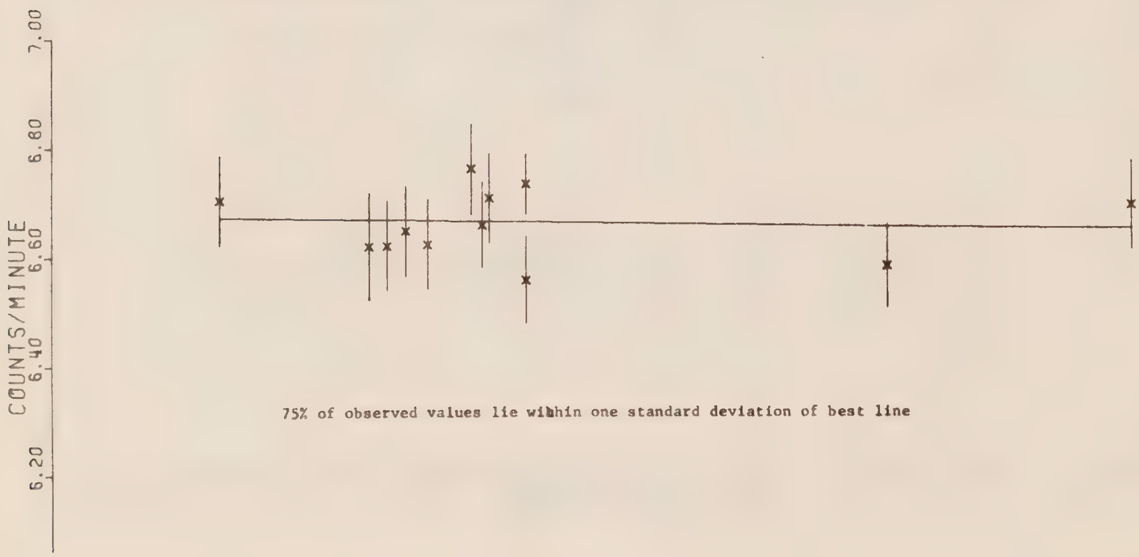


NBS OXALIC ACID STANDARDS 1,2,3 USING CORRECTED (OR UNCORRECTED) CPM
COUNTS/MINUTE
6.00
6.20
6.40
6.60
6.80
7.00
730.00
734.00
738.00
742.00
746.00
750.00
754.00
758.00
762.00
766.00
770.00
BAROMETRIC READING
Values marked with the dashed line are corrected values
54.8% of uncorrected & corrected points lie within one standard deviation of best line
77.8% of corrected points lie within one standard deviation of best line

INTERCALIBRATION SAMPLE QL-202 USING CORRECTED (OR UNCORRECTED) CPM



INTERCALIBRATION SAMPLE QL-202



APPENDIX

A1 Revised Operation Procedures for Ocean Chemistry Radiocarbon Laboratory from Report by R.D. Clyne, May 1973.
(For more complete details see a copy of the original report available in the laboratory.)

A1.1 Preparation of CO_2 by Oxidation of Oxalic Acid by Acidified $KMnO_4$.

$$5(COOH)_2 + 2KMnO_4 + 3H_2SO_4 \rightarrow K_2SO_4 + 2MnSO_4 + 8H_2O + 10CO_2\uparrow$$

(See P. Karrer, Organic Chemistry, Nordemann N.Y., p. 294(1938).)

Procedure:

1) Dissolve Oxalic Acid 11.25 g (dihydrate 15.75 g) in 125 ml boiled distilled H_2O in flask Z.

2) Dissolve 8.15 g $KMnO_4$ in 200 ml hot distilled H_2O and add 4.5 ml 36N H_2SO_4 (cover to minimize dissolution of air CO_2).

3) Close S-1, S-2 and pump line until oxalic solution bubbles, then close S-3 and evacuate completely.

4) Close S-8 and open S-2 to purge with nitrogen gas, then re-evacuate (follow procedure twice).

5) Place dry-ice around traps 8 and liquid N_2 around trap 6.

6) Fill vessel 1 with $KMnO_4$ solution; slowly open S-1 to admit solution to flask 2, start stirrer.

7) Allow reaction to procede slowly, periodically opening S-3 and S-4 monitoring the pressure at approximately 1/2 atmosphere and removing water in trap 8.

8) With S-3 closed, periodically open S-6 to trap CO_2 in trap 6; with S-6 closed pump on trap 6 by opening S-8 monitoring pressure with Pirani 9.

9) Retain some $KMnO_4$ always in vessel 1 by replenishing until reaction goes to completion (brown sol = remains); stir and simmer for approximately 1/2 hour while periodically trapping out CO_2.

10) Do not let CO_2 line pressure exceed 1/2 atmosphere.

Appendix (cont'd)

11) After total CO_2 liberation and trapping in trap 6, (a brown precipitate remains in flask 2), liquid nitrogen may be removed from the trap with S-6 closed and S-10, S-14 open and CO_2 collected in 5 liter storage bulb 12 or passed directly through the wet purification line via S-7, 8, 9, 10 and 16.

12) Line should be pumped between S-9 and S-1 and left full of nitrogen admitted through S-2.

Note: To ensure the reaction goes to completion and to minimize fractionation, the flask may be heated (simmer) for approximately 1/2 hour and residual CO_2 collected.

A2 <u>Preparation of CO_2 Using Parr Combustion Bomb</u>

<u>Procedure</u>:

1) Sample must be chemically prepared*, finely divided, dried and placed in clean combustion cup.

2) A new fuse wire is inserted (Parr Bomb Instruction Manual). The bomb reassembled, pressurized to 15 atmospheres with high purity oxygen, sealed at S-13 and fired in its protective shield.

3) Valves S-12 and S-11 are used for gas release flow regulation in conjunction with manometer 7 and bubbling rate in solutions 18, 19, 20.

* The organic sample is finely divided, boiled in 0·1N HCl, NaOH and again in HCl for approximately 3-4 hours each, washed in distilled water and oven dried.

A3 <u>Preparation of CO_2 by Vycor Tube Combustion (See W.S. Broecker, et.al</u> Int. J. Apps. Rad. Isotopes <u>7</u>, 1 (1959); and W. Dyck; GSC Report 66-45, 1967.)

1) Following the procedure of Broecker et. al., flow of nitrogen and oxygen in succession and regulated and dried via traps 16 and 17; the sample volatiles and non-volatiles are combusted in the gas stream within a Vycor furnace 13 to produce CO_2 before passing via S-10 to the wet purification line.

A4 <u>Wet Line Purification of CO_2</u>

<u>Procedure</u>:

1) Before use, the wet line from S-16 (including S-9, S-10) to S-22 should be evacuated via S-20.

2) Then with S-20 closed, S-16 is slowly opened to the nitrogen

Appendix (cont'd)

gas supply which bubbles through traps 18, 19, 20 until approximately 5-10 cm Hg pressure is recorded at manometer 7 via S-19. (An ascarite filled flow trap in the nitrogen line may be inserted to absorb any CO_2 in the nitrogen purge gas.)

3) S-20 is partially opened to maintain a nitrogen purge gas pressure of 5 cm Hg.

4) S-10 is opened and flow (or static) pressure of CO_2 monitored on manometer preceding trap 5-6.

5) S-16 is now readjusted to maintain a similar flow rate at manometer 7 (S-19) and to regulate a moderate bubbling rate through traps 18, 19, 20.

6) Dry ice is placed around trap 8 and liquid nitrogen placed around trap 6. The oxygen combustion gas is continuously pumped through S-20 via S-9 and S-8 to pump 10.

7) After almost total CO_2 collection through the bubblers, complete recovery is achieved by purging with nitrogen.

8) The CO_2 is pumped while frozen in trap 6 under liquid nitrogen then admitted to storage bulb 12.

9) The line pressure is equalized and brought to 1 atmosphere with nitrogen to minimize back-streaming of the liquids in the bubblers.

A5 Hot Pt-Asbestos and Cu furnace Purification + Radon Removal

1) The furnace line is initially evacuated by mercury diffusion pump to better than 10^{-4} mm Hg with both furnaces at 420°C.

2) The CO_2 gas is passed via S-23, 24 through the platinum-asbestos furnace at a few cm Hg pressure monitored by manometer 7 from S-27.

3) The gas is either trapped in 6 or cycled via S-29, 37 to the copper furnace 13 and after multiple passes through the furnace, stored in a 5-liter flask 12 through either S-35, S-51 or S-49, a sample of which is stored in 22 for carbon-13 istope fractionation determination.

4) Radon removal trap 23 is 95% successful or better for this purpose and also removes nitrous oxides. The outer copper tube is placed in liquid nitrogen, the sample frozen at -78°C and then pumped for 2 or 3 short periods of a few seconds duration each.

Appendix (cont'd)

5) The copper furnace 25 is regenerated by filling with hydrogen gas via S-42 while at 420°C and then evacuating to 10^{-4} torr.

A6 References

A6.1 General Reference List

1. American Journal of Science, Radiocarbon Supplement.

2. Nobel Symposium 12, 1970: Radiocarbon Variations and Absolute Chronology, John Wiley and Sons Inc., Uppsala, Sweden.

3. Royal Society of New Zealand, 1972: Radiocarbon Procedings New Zealand, Wellington.

4. International Conference of Radiocarbon and Tritium Dating, 6th Procedings, June 7-11, 1965: Washington State University, Pullman, Washington. Conf. 650652. TID-4500(1966).

5. International Atomic Energy Agency, Vienna, 1963: Radioactive Dating Procedings of a Symposium, 1962, Nov. 19-23, Athens.

6. Dyck, W., 1967: The Geological Survey of Canada Radiocarbon Dating Laboratory GSC, Dept. of Energy Mines and Resources Paper 66-45.

7. Libby, W.F., 1965: Radiocarbon Dating, Univ. of Chicago Press.

8. Radioactive Dating Methods of Law Level Counting, 1967: IAEA, Vienna.

9. Venverloo, L.A.J., Practical Measuring Techniques for Beta Radiation, MacMillan.

10. Dorsey, H. Gorman, 1973: Precise Measurement of Oceanic Radiocarbon, M. Sc. Thesis, University of Miami.

A6.2 Instrumental Reference List

Brannon, H.R., M.S. Taggart, Jr. and M. Williams, 1955: Rev. Sci. Instr., 261,3, 269.

Broecker, W.S., C.S. Tucek and E.A. Olson, 1959: Inst. J. Appl. Rad. Isotopes, 7, 1.

Broecker, W.S., J.L. Kulp and C.S. Tucek, 1956: Science, 124,154.

Fergusson, G.J., 1955: Nucleonics, 13, 18.
---,and G.J. McCallum, 1957:N.A.J. Sci. Tech., B38, 577.

Houtermans, F.G. and H. Oeschger, 1958: Helvetia Physica Acta, 31, 117.

Kulp, J.L. and L.E. Tryon, 1952: Rev. Sci. Instr., 23, 296.

Moljk, A. and S.C. Curran, 1954: Phys. Rev. 96, 395.

Olsson, I.U., 1968: Earth Sci. Rev., 4.

Sheckler, A.C., 1951: Nucleonics, 8, 44.

Tamers, M., 1961: Geochem and Cosmochim. Acta, 24 (314), 266.

Vries, H. de, M. Stuiver, I.U. Olsson, 1959: Nucl. Instr. Methods, 5, 111.

Vries, H. de, and G.W. Barendsen, 1953: Physica, 19, 987; 1952: 18, 652.